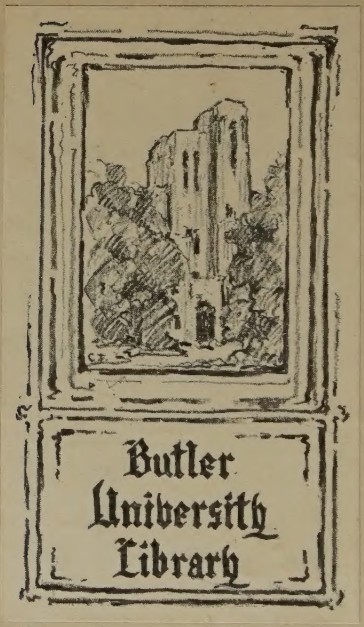
MANUAL OF CULTIVATED TREES AND SHRUBS

REHDER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CORRECTIONS AND EMENDATIONS

OF

REHDER'S MANUAL

OF CULTIVATED TREES AND SHRUBS

By

Alfred Rehder

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Jamaica Plain, Mass.

1935

INTRODUCTION

After eight years of constant use of the Manual of cultivated trees and shrubs by the author and by the staff of the Arnold Arboretum a considerable number of corrections have been accumulated and have been recorded in the author's desk copy of the Manual. Acting on the suggestion that these corrections should be made accessible to owners of the Manual the following list has been compiled. For the publication of this list thanks are due to Mr. Clarence McK. Lewis of New York for advice and financial help.

Arnold Arboretum
Jamaica Plain, Mass.
February 1935

Alfred Rehder

Manual of cultivated trees and shrubs

hardy in North America

by

Alfred Rehder

1927

Corrections

1935

Page

XIV line 12 for "from 5 to 5 degrees" read "5° F. for each zone."

XV line 1 transfer "Albizzia julibrissin" to the following line before "Magnolia."

line 23 for "Metric" read "metric"

line 11 from below for "specimen" read "specimens"

XVII under Ashe for "contemp." read "1872-1932."

under Beck for "contemp." read "1856-1931."

under Beiss. for "contemp." read "1843-1927."

under Berger for "contemp." read "1871-1931."

below Bess. insert "Best-Best, George Newton; 1846-1926."

under Br. N. E. for "contemp." insert "1849-1934."

under Brand for "1863-1917" read "1863-1931"

under Brit. for "contemp." read "1859-1934."

under Callier for "contemp." read "1866-1927."

under Christ for "1833-1921" read "1833-1933."

XVIII under Coult. for "contemp." read "1851-1928."

under Engl. for "contemp." read "1844-1930."

above Farr insert "Fabric. - Fabricius, Philipp Konrad; 1714-1774."

below Fisch. & Mey. insert "Fluegge - Fluegge, Johann; 1775-1816."

XVIII under Gand. for "contemp." read "1850-1926."

below Gand. insert "Gilg - Gilg, Ernst; 1867-1933."

under Graebn. for "contemp." read "1871-1933."

above Hand.-Mazz. insert "Hacquet - Hacquet, Balthasar; 1740-1815."

after Hedl. insert "Hedw. f. - Hedwig, Romanus Adolf; 1772-1806."

XIX under Henry for "contemp." read "1857-1930."

below Lawson insert "Laxm. - Laxmann, Eric; 1737-1796."

below Léveillé insert "Lge."; see under Lange

under Litvin. for "contemp." read "1854-1929."

under Marsh. for "Humphrey" read "Humphry"

under Matsum. for "contemp." read "1855-1928."

XX under Morr. for "Mooren" read "Morren"

below Morr. insert "Moss - Moss, Charles Edward; 1872-1930."

under Mottet for "contemp." read "1861-1930."

under Muell. Arg. for "Muell., Arg." read "Muell. Arg."

below Murr. A. insert "Mutis - Mutis, Jose Celestino; 1732-1808."

under Nakai for "Takenoshi" read "Takenoshin"

below Nels. E. insert "Neum. - Neumann, Auguste; ?-1858."

XX under Norton for "John Biting Smith" read "Jesse Baker"
under Pritz. for "Georg August" read "Ernst"
below Pritz. insert "Puskyne - Puskyne, Emanuel von, 1831-1882."
under Rose for "contemp." read "1862-1928."
under Rouy for "contemp." read "1851-1924."
under Rydb. for "contemp." read "1860-1931."
under Sarg. for "contemp." read "1841-1927."
below Sarg., H. W. insert "Sart. - Sartorelli, Giovanni Batista; wrote about 1816."

XXI under Schwer. for "contemp." read "1856-1934."
below Seemen insert "Sénécl. - Sénéclauze, Adrien; wrote about 1860-1867."
below Shiras. insert "Shull - Shull, George Harrison; contemp."
under Skeels for "contemp." read "1873-1934."
under Stapf for "contemp." read "1857-1933."
under Sudw. for "contemp." read "1864-1929."
below Tidestr. insert "Toepff. - Toepffer, Adolf; 1853-1931."
under Wettst. for "contemp." read "1863-1931."
under Willm. for "contemp." read "18..-1934.
under Wils. for "contemp." read "1876-1930."
under Wolf, E., for "contemp." read "1860-1931."

XXII below C. B. insert "C. C. . . . Chun, W. Y., Chinese economic trees O. Shanghai, 1922. Il."
below Em. insert "E. H.... Elwes, H. J., & Augustine Henry, Trees of Gt. Brit. & Irel. 7 vols. Q. Edinburgh,1906-13. 412 pl.
below P. G. insert "P. I. . . . Pardé, Léon. Iconographie des conifères fructifiant en France. F. Paris, 1912-14. 30 pl."

XXV under W. J. for "1816" read "1916"

XXVII under Approximate equivalents line 2 col. 2 for "= 1/2 of an inch" read "= 1/12 of an inch"

XXX under E. FF. GG. H. line 3, after epigynous insert "flowers regular"
under EE. F. G. line 2, after "opposite the sepals" insert "(except in Fam. 59)"
under EE. F. G. HH. II. J. after Lvs. insert "pinnately veined" and for "plant" read "plants"

8 under BB. CC. D. E. after "deciduous" insert "cone ripening the first season."

10 under 7 line 10 after "varieties" insert "the typical upright form (var. erecta Pursh) is common in Eur., less so in N. Am."
line 17 from below for "Shrub" read "shrub"
line 8 from below for "J. m." read "J. nana"

12 under J. utahensis line 6 for "4-6" read "4-10"

13 under J. excelsa line 7 for "S. W." read "S. E."

14 line 2 for "brts." read "brs."

15 under J. Sabina var. lusitanica omit "(J. sabinoides Griseb.)"
under J. horizontalis var. plumosa after "Rehd." insert "Andorra J."

20 under Thujopsis for "T. dolobrata" read "T. dolabrata"

23 line 1 for "Schneid." read "Mast."
line 2 after "Bean" insert "G. C. III. 41: 200 (h)."

28 under Keteleeria, key A. for "glabrous, orange-red" read "with short soft pubescence" and under AA. for "puberulous" read "short pilose"

29 under A for "nos. 1 and 24" read "nos. 1, 17 and 24"
under BB. CC. D. E. F. G. for "Winter buds very resinous" read "Brts. not grooved," and 4 lines below under GG. omit "Winter buds slightly resinous" and "sharply bifid"
under BB. CC. D. E. FF. GG. HH. II. for "6" read "26"

31 under 9. line 3 for "scracely" read "scarcely"

32 under 10. line 4 after "acutish" insert "or on young plants bifid and sharply pointed"

33 under 15. var. brevifolia line 3 after "Henry," add "A. Gamblei Hick."
under 16. for "Spach" read "Royle"

34 under 21. line 8 omit "Greece"

35 under 24. line 4 before "slightly" insert "usually"

36 line 1 after "olive-green" insert "or olive-brown" and after "pubescent" insert "soon nearly glabrous"
under 31. omit comma after magnifica

37 under 16. A. for "taxifolia" read "mucronata"
under 1. for "taxifolia Britt." read "mucronata Sudw."

39 under 4. line 4 omit "emarginate"
under 5. T. canadensis var. pendula line 4 for "Hort." read "Bean"

40 line 3 for "Sarg." read "Eichl."

41 under AA. B. CC. D. E. F. for "3 cm." read "2.2 cm."

43 under 10, line 10, after "cult." add "occasionally escaped in E. N. Am."

46 under 16. for "P. rubra Link" read P. rubens Sarg."
under 16. line 8 for "P. rubens Sarg." read "P. rubra Link, not A. Dietr."

47 under 21. Var. argentea for "Beiss." read "Rosenthal"

48 under 25. line 1 for "Maxim." read "Carr."

50 for "20. LARIX" read "19. LARIX"

51 under 3. line 1 for "L. Kaempferi Sarg." read "L. leptolepis Murr."
under 3. line 7 for "leptolepis" read "Kaempferi Sarg., not Gord."

52 under 7. line 1 for "laricina" read "laricina."

55 line 2 for "13" read "12"
under AA. BB. C. after "glaucous" transfer from BB. "resin ducts medial"

56 under 1. line 7 for "Zone V" read "Zone III"
under 4. line 3 for "rigid" read "slender"

58 under 11. line 1 for "strobus" read "Strobus"

59 under Subgen II. after "Koehne" insert "Pitch Pines"

60 under P. sylvestris var. engadinensis line 2 after "long" insert "persisting for 8 years" and before "oblique" insert "with"

63 under 28. line 4 for "lvs. 2" read "lvs. 2-3"

65 line 1 after "Carr.)" insert "Zone V."

73 under 3. Phyllostachys line 9 for "lead" read "leaf"

74 under 6. line 1 for "P. reticulata K. Koch" read "P.bambusoides Sieb. & Zucc."
under 6. line 7 for "P. bambusoides Sieb. & Zucc." read "P. reticulata K. Koch, not B. r. Rupr."

78 under 4. Philesia line 7 for "P. buxifolia Lam." read "P. magellanica Gmel." and line 11 insert "(P. buxifolia Lam.)"
80 under 4. line 7 before "Intr." insert "China."
83 under 1. Populus line 5 after "laciniate" insert "or incised to entire"
88 under 16. line 6 after "stamens 8" insert "(P. Przewalskii Maxim.)"
under 19. line 1 for "P. suaveolens Fisch." read "P. cathayana Rehd."
under 19. line 3 for "ovate-lanceolate" read "narrowly ovate"
under 19. line 4 after "or" insert "subcordate, rarely"
under 19. line 7 for "1-4 cm." read "2-6 cm."
89 line 1. for "(P. balsamifera var. s. Loud.) Turkest, W. China to Korea, Intr. 1834. Zone IV" read "(P.suaveolens auth., not Fisch.) N. and N. W. China, Manch. Cult. before 1900? Zone V."
line 2, omit line 2, 3 and 4 after "Zone IV."
90 under 26. line 1 for "P. Wislizenii" read "P. Wislizeni"
line 8. from below for "P. MacDougalii" read "P. Macdougalii"
91 line 8. for "Dur." read "Muenchh."
94 under A. B. C. D. E. FF. after "Group" insert "6."
98 under A. for "Bracts" read "Scales"
99 under AA. for "Bracts" read "Scales"
102 under B. CC. DD. E. for "25" read "35"
105 line 3. from below, for "bitzensis" read "britzensis"
109 under 25. after "Alps;" insert "N. As.;"
117 line 6. for "W. Koch" read "Zahn"
119 under 57. for "incana Schrank" read "Elaeagnos Scop."
127 under BB. C. DD. E. omit "in pendulous racemes"
under J. regia var. praeparturiens for "Duchartre" read "Lem."
129 line 6, for "7-10" read "4-6.5"
under 7. line 6 for "pendulous" read "short"
line 3. from below for "beong" read "belong"
130 under 4. Carya line 10, after "China" add "and 1 in Tonkin"
under AA. BB. C. for "8. C. alba" read "8. C. tomentosa"
131 under 2. line 15 for "Intr. ?" read "Intr. 1917"
132 under 6. line 1 for "Small Pignut" read "Sweet Pignut"
under 8. line 1 for "C. alba K. Koch" read "C. tomentosa Nutt."
133 line 7. for "C. tomentosa Nutt." read "C. alba K. Koch, not Nutt."
under C. Laneyi var. chateangayensis line 3. after "bitter" insert "or sometimes sweet"
135 under AA. B. C. D. EE. FF. for "B. alaskana" read "B. neoalaskana"
139 under 16. line 1 for "Ait." read "Marsh."
line 2. from below for "aurata Bechst." read "B. aurata Borkh. (B. hybrida Bechst.)"
141 under 22. line 8 for "H. T." read "H. H."
143 under 29. B. nana var. Michauxii line 3, after "Lab." insert "Nfdl."
144 line 1. from below for "viridis" read "alnobetula"
145 under 5. line 7 for "viridis" read "alnobetula"
146 under 8. in A. oblongifolia line 4 after "457" insert "(as A. acuminata)"
148 under 3. Carpinus line 8 strike out "usually 3-lobed"

149 under A. BB. CC. for "Turczaninowii" read "Turczaninovii"
150 under 6. line 1, for "Turczanininovii" read "Turczaninovii", and line 11, for "Turczananovii" read "Turczaninovii"
157 under AA. B. CC. for "appendages at base of involucre" read "appendages of involucre foliaceous".
under 1. F. grandifolia var. caroliniana line 4, for "N. J." read "E. Mass."
159 line 7 for "fls. and frs. unknown" read "involucre with short deltoid processes; nut exserted; stalk 1 cm. long"
161 under 4. C. chrysophylla line 5 for "1 cm." read "1.5 cm."
162 under 5. L. densiflora line 9, for "echinoides" read "montana", and line 10, before "Quercus" insert "var. echinoides Abrams"
163 under AA. B. C. DD. E. FF. for "falcata" read "rubra" and change the nos. below as follows: 10 to 9, 11 to 10, 15 to 14, 12 to 11, 13 to 12, 14 to 13, 16 to 15, 18 to 17, 19. Q. serrata to 18, Q. acutissima, 21 to 20, 20 to 19, and 24 to 23.
164 under CC. D. E. FF. G. H. for "22" read "21"
under DD. E. F. GG. HH. II. for "45" read "46" and below for "46" read "45"
under DD. EE. FF. G. HH. II. J. for "46" read "45" and below for "39. Q. pubescens" read "39. Q. lanuginosa"
165 under AA. B. CC. D. for "17" read "16" and below for "25" read "24"
under 1. line 2, for "7-12" read "5-12" and for "2-3" read "1.5 -3", and line 6 after "Japan" insert "E. China"
under Q. glauca line 4 for "Japan, China" read "E. Asia",
line 4 from below for "17" read "16"
166 line 9 for "Michx." read "Michx. f."
169 line 1 for "L." read "Muenchh." under 14.
170 line 3 for "Sarg." read "Ashe"
line 4 for "cup" read "acorn"
under 18. line 1 for "serrata Thbg." read "acutissima Carruthers," and line 7 for "acutissima Carruthers" read "serrata Sieb. & Zucc., not Thbg."
171 under 20. line 1 for "Oliv." read "Olivier"
174 under 30. Q. andleyensis line 2 after "lobed" insert "(Q. Koehnei Ambrozy)"
175 under 36. line 1 for "macránthera" read "macranthèra"
180 line 2 after "beneath" insert "finally glabrescent"
182 line 4 for "Houba" read "Sarg."
under 56. line 7 before "Japan" insert "(Q. serrata Thbg.)"
184 under 3. line 1 for "racemosa Thomas, not Borkh." read "Thomasi Sarg." and line 2, after "year" insert "rarely glabrous"
185 line 4 for "Thomasii Sarg." read "racemosa Thomas, not Borkh."
186 line 1 from below for "Mill." read "L. in part"
188 under var. Klemmer for "Klemmer" read "klemmer"
190 under 13. line 1 for "Dwarf E. Small tree to 15" read "Siberian E. Tree to 25"
under 14. U. crassifolia line 4 after "small" insert "ciliate"
194 line 1, for "C. rugosa" read "C. rugulosa"
under 4. line 8 for "Intr. 1656" read "Cult. 1636"
197 under 2. line 1 for "acidosa Griff." read "australis Poir."
line 2 from below after "Bur.," insert "M. acidosa Griff."

206 under Atraphaxis line 1 before "Atraphaxis" insert "2" and for "L," read "L."
211 under Salsola line 7, for "laricina" read "laricina"
215 under 2. Zanthorhiza line 1 for "Zanthorhiza L'Hérit." read "Xanthorhiza Marsh."
line 3 from below, for "Xanthorhiza Marsh." read "Zanthorhiza L'Hérit."
line 1 from below, for "Z. apiifolia L'Hérit." read "X. simplicissima Marsh."
216 line 3 after "377 (h)." insert "(Z. apiifolia L'Hérit.)"
217 under CC. D. EE. F. omit "climbing shrubs"
under BB. CC. D. after "pinnate" insert "or bipinnate"
218 line 1 after "Sims," insert "C. Simsii Sweet,"
under 3. line 1 for "Simsii Sweet" read "Pitcheri Torr. & Gr."
under 3. line 7 for "Pitcheri Torr. & Gray" read "Simsii auth., not Sweet"
219 under Group 3. line 3 for "stamens" read "filaments"
224 under 23. in C. vedrariensis line 5 for "1817" read "1917"
225 under 27. in C. chinensis line 1 for "Retz." read "Osbeck"
230 under H. grandiflora line 2 and 3 omit "(rounded and ovate to oblong-elliptic in young cult. plants)"
231 under Akebia 2. line 1 for "lobata Done." read "trifoliata Koidz.;" line 6, before "C. China" insert "(A. lobata Done., Clematis t. Thbg.)"; line 7 for "Diels" read "Rehd."
234 under 5. line 7, before "B. C." add "(Berberis n. Pursh)"
236 under AA. for "(See also AAA)" read "(sometimes in racemes in 20)."
under AAA. B. C. D. E. FF. G. H. for "4 cm." read "4 mm."
238 under 4. in B. actinacantha line 3 after "55 (c)." insert "Chile."
242 under 22. var. Prattii line 3 after "Schneid." insert "B. brevipaniculata Bean, not Schneid."
244 under 27. line 1 for "lycium" read "Lycium"
246 under 36. line 1 for "Poiretii" read "Poireti"
250 under A. B. for "Calycarpon" read "Calycocarpum"
253 under 1, var. cordata Sarg. line 3 for "(M. c. Michx.)" read "Should be considered a distinct species, M. cordata Michx."
under 1. var. cordata line 2 for "B. R. 25" read "B. R. 325"
254 under 4. line 1 for "Pursh" read "Bartr."
256 under 13. line 12 for "M. aulacospermum Rehd. & Wils." read "M. Biondii Pamp." and line 14 before "C. China" insert "(M. aulacosperma Rehd. & Wils.)"
257 under 16. line 14 for "B. R. 26" read "R. B. 26"
258 under Liriodendron 1. var. obtusilobum line 1 for "Pursh" read "Michx."
261 under 1. Calycanthus line 4 after "flowers.)" insert "(Butneria Duh., Beureria Ehret.)
265 under 3. line 1 for "grandifolium Rehd." read "touyunense Rehd."; line 8 after "Hemsl." add "B. grandifolium Rehd."
270 under A. BB. C. D. EE. omit "pubescent"
271 under CC. D. E. for "oblong-obovate" read "usually oblong-ovate"
under CC. D. EE. F. after "teeth" insert a comma
under AA. B. C. DD. E. for "28" read "29"
274 under 11. line 5 for "strigose pubescent" read "strigose-pubescent"
under 12. line 8 for "5-9-fld." read "5-11-fld."

279 under 30. P. argyrocalyx line 3 after "beneath;" insert "fls. 3.5-4 cm. across,"
282 line 3 from below for "valvate" read "imbricate", line 1 from below, for "19" read "20"
283 line 2 for "20" read "19"
284 under 4. var. candidissima after "fls." insert "double,"
287 under 15. line 10 after "222" insert "C. and W. China. Intr. 1897. Zone (V)."
288 under Sect. II. for "valvate" read "imbricate"
296 under 16. line 8 after "1875" insert "Zone III."
297 under 11. Itea line 9 for "virginiana" read "virginica"
298 under A. after "racemes;" insert "calyx deciduous,"
299 under AA. line 2 after "30)" insert "calyx persistent."
300 under R. tricuspe for "tricuspe" read "tricuspis"
under 1. R. Vilmorinii for "Vilmorinii" read Vilmorini"
304 under 13. line 10 for "Intr. 1826" read "Cult. 1818."
307 under 22. line 11 for "Intr. 1777" read "Cult. 1641"
319 line 3 from below for "antumn" read "autumn"
320 under AA. BB. CC. for "nearly 2" read "about 1"
321 under 7. for "Gotoana Makino" read "glabrescens Franch. & Sav."
322 line 2 after "across" insert "(C. Gotoana Makino)."
under 8. line 5 for "nearly 2" read "about 1"
under 8. line 8 for "1874" read "1862 to Am."
329 under AA. B. C. DD. EE. for "bipinnate" read "3-pinnatifid"
under 1. Physocarpus, key A. BB. after "pubescent" add "usually 3 or 4" and under A. BB. C. for "Pods usually 5" read "Lobes of lvs. acute or acuminate" and under A. BB. CC. for "Pods usually 3 or 4" read "Lobes of lvs. obtuse"
333 under AA. B. CC. D. after "glabrous" insert "or slightly pubescent"
under AA. BB. CC. D. EE. FF. for "penninerved" read "indistinctly 3-nerved"
334 under B. C.DD. for "sepals" read "petals"
335 line 4 after "is" insert "the type,"
under 3. line 9 for "R. multiflora" read "S. multiflora"
337 under 12. Var. sericea line 2 for "S. E. Asia" read "N. E. Asia"
338 line 4 for "8 cm." read "8 mm."
341 under 26. line 4 for "incisely" read "simply", and line 8 for "t. 92" read "t. 192"
under 27. line 4 for "serrate" read "and doubly serrate or lobulate"
346 under 44. line 7 for "225" read "245"
349 under 2. line 7 for "95" read "75"
351 under A. for "15, 3 in front" read "15-25, 3-5 in front"
352 under H. discolor line 11 for "arieafolius" read "ariaefolius"
353 under A. B. C. DD. E. F. for "rotundifolia" read "disticha"
under A. B. CC. DD. EE. F. G. after "orange" insert "lvs. 1-3 cm. long"
354 under 1. line 7 after "Schneid." add ", C. praecox Hort."
under 3. line 1 for "rotundifolia Wall." read "disticha Lange" and line 8 for "disticha Lange" read "rotundifolia Bak., not Lindl."
358 under 21. line 6 after "red" insert "; stones 1-2"
359 line 6 for "songarica" read "soongorica"
line 2 from below for "C. China" read "W. China"
361 under 30. line 5 for "stamens" read "anthers"

361 under A. B. in key after "pubescent" insert "(see also var. of 2)"
under A. BB. C. for "2. C." read "2. P."
under A. BB. CC. for "3. C. Gibbsii" read "3. P. crenato-serrata"
under AA. for "4. C." read "4. P."
under 1. for "C." read "P."
362 under 3. line 1 for "Gibbsii A. B. Jacks." read "crenato-serrata Rehd."
line 6-7 for "G. C. III. 60: 309; 63: 47 (h); 73: 23" read "B. M. 9099, f. 5-10"
line 7 for "Var. yunnanensis Osborn" read "P. yunnanensis Chittenden, P. Gibbsii Rehd., not A. B. Jacks.,"
line 11 for "P. discolor Rehd." read "P. atalantioides Stapf"
line 13 after "cult." add "B. M. 9099 f. 1-4 (P. discolor Rehd., P. Gibbsii Jacks.)"
364 under A. BB. after "surface" insert "(except in C. dsungarica under no. 32)"
366 under 4. line 8 after "359 (h)" insert "B. S. L: 424 (as C. acutiloba)"
under 6 C. acutiloba line 3 omit "B. S. L: 424"
371 under 26. for "pink" read "yellow"
372 under 29. line 1 for "Lk." read "Schrad."
373 line 8 after "apex" insert "; stone smooth on ventral surface"
under 34. line 7 for "1801: 301" read "1901: 308"
under 35. line 1 before "Kit." insert "Waldst. & "
377 under Lvs. simple A. BB. C. D. omit "with 5-6 pairs of veins"
379 under 7. line 6 for "Reg." read "Franch."
380 under 12. line 3 for "veins below," read "veins, below"
under 12. line 8 after "Bechst." insert "S. quercifolia Hort."
382 line 10 after "Emendations" insert "p. 858"
line 2 from below before "S. caloneura" insert "19."
384 under 19. line 1 for "Pers." read "Med."
386 under 2. line 6 for "Rehd. & Wils." read "Schneid."
387 line 9 before "orange" insert "coral-red to"
389 under 7. line 3 after "rounded" insert "or subcordate"
392 under AA. BB. C. after "slender" insert ";"
393 line 3 for "7579" read "7975"
395 under 6. line 1 for "theifera Rehd." insert "hupehensis Rehd."
under 6. line 8 after "Bailey" insert "M. theifera Rehd."
under 7. var. spontanea line 1 for "Rehd." read "Koidz."
396 under 10. line 7 for "om." read "mm."
under 10. M. sublobata line 5 for "usually, with" read usually with"
under 11. line 7 for "mm." read "om."
397 under 15. line 3 after "serrate" insert "and partly doubly serrate"
398 under 20. line 5 after "thin:" insert "fls. 3-4 cm. across; pedicels glabrous;"
400 under 27. Docynia line 8 for "docynioides Rehd." read "rufifolia Rehd.", and line 15 after "Schneid" insert "D. docynioides Rehd., Pyrus rufifolia Lévl."
406 line 3 after "pear-shaped" insert "brown to yellow"
407 under 31 for "Neviusa" read "Neviusia"
407 under 32. K. japonica line 7 after "Thbg.)" insert "C. and W. China."

409 under II. AA. BB. CC. for "omeiensis" read "setchuenensis"
411 under 5. line 8 after "Swinhoei" insert "Hemsl."
414 under 22.R. rosaefolius line 4 after "Asia" insert "Zone VIII."
416 under 32. line 1 for "Giraldianus Focke" insert "Cockburnianus Hemsl." and line 6 after "VIII-IX" insert "(R. Giraldianus Focke)"
421 under 49. line 2 after "firm," insert "partly evergreen"
424 under Dryas 2. line 5 after "Mont." insert "and Quebec"
427 under AA. line 2 after "stylosa" insert "R. microcarpa,"
428 under Sect. 2. A. BB. DD. E. FF. before "R." insert "9."
429 under Sect. 10. AA. B. C. D. E. FF. omit "doubly serrate,"
under Sect. 10. CC. D. E. F. GG. for "Davidii" read "Davidi"
432 under 10. line 8 before "C." insert "E, and"
434 line 1 after "China." insert "Zone VIII."
under 17. line 7 before "Murr." insert "Lindl., not"
under 18. line 4 after "fls." insert "pink"
435 line 18 for "No. 41" read "No. 40"
under 19. line 7 for "sinica L." read "sinica Murr."
436 under 22. var. officinalis after "Thory" insert "Apothecary R."
438 under 28. line 6 after "hispid" insert "or smooth"
441 under 39. line 5 omit "sometimes white,"
442 line 7 for "Chamissonis" read "Chamissoniana"
444 line 1 after "serrate" insert "glandular beneath"
line 11 after "pubescent" insert "or nearly glabrous"
449 under 69. line 4 before "pubescent" insert "slightly"
450 under R. sericea line 2 after "long," insert "serrate only near apex"
under 72. line 8 for "hirsuta" read "hirtula"
451 line 4 for "hypoleuca" read "hypoxantha"
line 7 for "glabrous, glaucous beneath" read "yellowish, strigulose on the veins"
453 line 6 for "P. nana" read "P. tenella"
454 under 1. line 8 after "Asia" insert "Long cult. Zone III."
455 line 7 for "Waugh" read "Fiori & Paol." and line 8 after "times" insert "Zone IV."
under 3. line 10 after "fr." insert "Zone IV."
457 under 10. for "allegheniensis" read "alleghaniensis"
459 line 8 for "pubescens" read "pubens"
461 under 23. line 7 for "D. F." read "F. D."
under 26. for "communis Arcang., not Huds." read "Amygdalus Batsch." and line 9 for "P. Amygdalus Batsch" read "P. communis Arcang., not Huds."
462 under 27. var. nucipersica for "nucipersica Schneid." read "nectarina Maxim.", line 2 omit "var. n. L., A. P." and line 3 omit "P. Persica var. nect. Maxim."
463 under 30. line 1 for "dehiscens Koehne" read "tangutica Maxim." and line 8 after "200" insert "(P. dehiscens Koehne)."
464 line 2 for "plena Dipp." read "multiplex Rehd.," and line 4 before "Intr." insert "(var. plena Dipp.)"
line 5 for "normalis" read "simplex"
under 32 for "nana Stokes" read "tenella Batsch" and line 7 after "n. L." insert "P. nana Stokes, not Duroi"
465 under 34. line 1 for "Stev." read Batsch"
470 under 53. var. nudiflora after "nearly so" insert "also the lvs."

476 line 4 for "with coarser more remote serration" read "rounded to broad-cuneate at base"
477 under 74. line 10 for "1903" read "1878"
478 line 3 from below after "pubescent" insert "or glabrous"
479 under line 8 for "Batal." read "Oliv."
480 under AA. BB. CC. D. E. FF. GG. before "deciduous" insert "usually"
481 under BB. C. omit "stipules subulate"
under BB. CC. for "31" read "32"
482 under 2. line 5 for "Intr." 1730" read " E. N. Am. Cult. 1641"
483 under BB. C. omit "ovate-oblong"
under BB. CC. for "ovate-lanceolate, 2-6" read "3-8"
484 under 6. line 5 after "lflts." insert "5-10 mm. long"
485 under 6. M. amurensis line 1 for "ft." read "m."
486 under 1. C. lutea line 7 for "V" read "IV"
487 under 9. P. tomentosus for "tomentósus" read "tomentòsus"
488 under 11. line 6 for "hedgehock" read "hedgehog"
492 under Laburnocytisus for "×" read +
494 under DD. E. omit "pod appressed-pubescent" and under DD. EE. omit "pod glabrous"
under 1. line 10 transfer "(Var. ochroleucus Zabel, var. pallidus hort.)" to line 12 after "580"
under 1. line 11 for "Nichols," read "Goldring"
495 under 4. line 1 for "glabrescens Sart." read "emeriflorus Reichenb." and line 6 for "emeriflorus Reichenb." read "glabrescens Sart., not Schrank"
under 4. line 2 for "glabrous" read "appressed-pubescent when young"
under 6. line 5 for "3-4-seeded" read "3-8-seeded"
500 under A. BB. C. for "petiele" read "petiole"
under A. BB. CC. D. for "petiol" read "petiole"
502 under 3. line 1 for "microphylla Pursh" read "nana Nutt." and line 7 for "nana Nutt." read "microphylla Pursh"
under 4. line 9 for "caroliniana Croom" read "cyanostachys M. A. Curtis" and line 12 for "Desf." read "Poir., A. caroliniana Rydb., not Croom."
under 5. line 1 for "6" read "4"
503 line 6 for "Mouillef." read "Loud."
line 11 for "tennesseénsis" read "tennessénsis"
under 6. line 6 for "Brongn." read "Boynt."
under 26. line 1 for "Wistària" read "Wistèria;" line 10 for "Wisteria Nutt." read "Wistaria auth., not Nutt."
under A. BB. C. after "glandless" insert "or slightly glandular"
505 under 1. line 1 for "pseudoacacia" read "Pseudoacàcia"
line 1 from below for "V" read "IV"
506 under R. Margaretta for "x hispida" read "x fertilis"
507 under 5. line 6 for "1758" read "1741"
509 under 4. line 5 for "1920" read "1911"
510 line 5 from below for "Bess." read "Steud."
line 1 from below for "Fisch." read "DC."
515 line 1 for "camelorum Fisch."" read "pseudalhàgi Desv."
under 36. Desmodium line 2 after "large" insert "stipellate"
under 36 D. tiliaefolium for "Don" read "G. Don"
516 under 1. line 4 after "pubescent" insert "rarely glabrous"
under 2. L. Buergeri before "Korea" add "(L. Maximowiczii Schneid.)"

519 under 1. Zanthoxylum line 8 for "each" read "usually" and for "style elongated" read "styles distinct or connate"
520 under 5. line 7 after "Korea" insert "E. China"
524 under 3. line 7 for "Cult. 1877" read "Intr. 1862"
525 under 2. line 8 for "P." read "S."
526 line 7 after "China," insert "Korea"
530 under 2. Securinega line 12 for "ramiflora Muell. Arg." read "suffruticosa Rehd." and line 18 after "Ktze." insert "S. ramiflora Muell. Arg."
531 line 1 and 2 from below for "3" read "2-3"
532 under P. terminalis line 2 after "obovate" insert "to ovate" and line 4 for "ovoid" read "subglobose" and for "3" read "2-3"
533 line 11 for "Muill." read "Muell."
535 under 1. P. chinensis line 7 for "118" read "218"
537 under 1. line 6 for "1726" read "1620"
under 5. line 1 for "javanica L." read "semialata Murr." and line 7 for "semialata Murr." read "javanica Thbg., not L."
539 under 12. line 10 for "1640" read "1623"
541 under Lvs. deciduous AA. BB. CC. for "5" read "4"
543 under 6. line 6 for "VII or VIII" read "(VI) VII."
546 under 2. Nemopanthus line 8 for "Ilicioides" read "Ilicioides"
548 under 2. line 8 omit "Franch. & Sav."
552 under 19. Var. minima line 2 for "(Var. kewensis Hort.)" read "——Var. kewensis Bean. Similar to the preceding, but lvs. smaller, 4-8 mm. long."
under 19. Var. Carrierei line 2 after "freely" add "lvs. often variegated."
under 19. Var. vegeta line 3 for "acute or obtusish" read "acutish or rounded"
554 line 4 for "spiciformis var. laevis Rehd. & Wils." read "Vanioti Rehd. var. laevis Rehd."
555 under 5. T. Regelii line 1 for "Shrub to 2 m., with long sarmentose" read "Sarmentose or climbing, occasionally to 10 m. or more, with"
556 under 1 Staphylea for "Staphylea" read "Staphylèa"
557 for "3. Euscaphis" read "2. Euscaphis"
558 for "4. Tapiscia" read "3. Tapiscia"
559 under A. B. C. E. FF. G. H. for "9" read "10"
under A. B. C. E. FF. G. HH. I. for "10" read "9"
under A. B. C. E. FF. G. HH. II. for "11" read "8"
560 line 5 from below for "sacharinum" read "saccharinum"
561 under 1. Var. Schwedleri line 2 for "197" read "198"
562 under 4. Var. parviflorum line 4 for "Pax." read "Franch."
line 6 from below for "J. H." read "J. L."
563 for "9. A. orientale" read "8. A. orientale"
565 line 2 after "Eu." insert "Asia Minor"
under 13. line 7 for "3.5" read "2.5"
under 13. Var. Schneckii after "beneath" insert "; petiole villous, rarely glabrous"
under 15. line 1 for "Michx." read "Michx. f."
under 15. line 5 for "or" read "and" and after "petioles" insert "usually"
566 under 18. line 8 for "since" read "for"
570 line 9 from below for "fls. yellowish white" read "sepals purple, petals white"
line 8 from below for "Intr.?" read "Intr. 1876"

572 line 13 for "green and reticulate beneath" read "strongly reticulate, green beneath"
578 line 13 for "Var. auratum Spaeth" read "Var. odessanum Rothe" and line 14 for "Var. odessanum Hort." read "Var. auratum Spaeth"
579 under AA. B. CC. after "yellow" insert "fr. without prickles"
580 under 4. line 1 after "lfts." insert "5-7,"
581 line 6 after "teeth," insert "glabrous or slightly" and for "glabrescent" read "glabrous"
582 line 6 after "margin" insert "and yellow to red"
583 under 13. for "13" read "12"
under 14. for "14" read "13"
584 under 2. K. paniculata line 5 for "gradually" read "abruptly" and line 7 for "Gng." read "Gg."
585 under Fam. 59 line 2 for "estipulate" read "exstipulate"
586 before "Meliosma" insert "2."
under AA. for "Veitchiana" read "Veitchiorum"
588 line 4 for "orientalis Hemsl." read "Hemsleyana Rehd."
590 line 6 for "6" read "4"
under A. B. CC. for "costatus" read "costata"
under BB. CC. D. EE. omit "lvs. large"
under AA. BB. C. D. E. FF. and below for "21" read "23," for "22" read "24", for "23" read "21", and for "24" read "22."
595 under 22. line 5 for "om" read "mm"
598 under 7. line 6 for "VII or VIII" read "VI (V)"
599 under Fam. 61. line 1 after "upright" insert a comma
602 under 5. line 11 for "Introd. 1806" read "Cult. 1656"
603 under 10. line 1 for "reticulata Pamp." read "Wilsonae Veitch," and line 8 after "236" insert "(V. reticulata Pamp., not M. A. Laws.)"
604 under 15. line 9 for "Intr. 1656" read "Cult. 1748."
605 under 16. line 1 for "Kaempferi K. Koch" read "Coignetiae Pulliat," line 7 for "V. Coignetiae Pulliat" read "V.Kaempferi Rehd., not K. Koch", line 9 for "Rehd." read "Nakai" and line 10 omit "(V. Coignetiae var. g. Nakai.)"
608 under 5. line 3 after "segment" insert "short-stalked" and line 7 for "J. H" read "J. L."
under 6, line 2 after "lfts." insert "attenuate at base and sessile,"
line 1 from below for "1867: 10" read "1867:451"
610 under 1. line 1 for "vitacea Hitchc." read "inserta Fritsch"
615 under 5. line 7 for "1886" read "1875"
under 5. T. kiusiana line 5 for "Intr. ?" read "Intr. 1930."
616 line 12 for "floridana Small" read "nuda Vent."
under 9. line 4 for "short-pubescent with simple hairs beneath" read "beneath greenish or grayish, loosely stellate-pubescent and on veins and veinlets with scattered mostly simple hairs"
617 under 14. line 4 for "tomentose" read "stellate-pubescent or nearly glabrous (var. subglabra V. Engl.)"
under 16. line 9 for "S. W. Eur." read "S. E. Eur."
618 under 2. G. parviflora line 1 for "parviflora Bge." read "biloba G. Don and for "tomentose" read "glabrescent", line 3 and 4 for "scabrous above, densely stellate-pubescent beneath" read "glabrous or nearly so above, slightly pubescent beneath"

618 and line 7 after "fr. X" insert "(G. glabrescens Benth., G. parviflora var. glabrescens Rehd. & Wils.) China. Cult. 1890. Zone VI or VII. --- Var. parviflora Hand.-Mazz. Brlts. tomentose; lvs. scabrous above, densely stellate-tomentose beneath. (G. p. Bge.)"; omit lines 9 and 10 after "Zone (V).

620 under Fremontia californica for "Nutt." read "Torr."

621 under 4. line 9 for "1886" read "1861"

622 line 5 after "yellow" insert "finally brown" and for "Intr.?" read "Intr. 1927"

under 2. C. lasioclada line 1 for "pubescent" read "puberulous" and lines 3-5 for "and villous along . . . . tufts of hairs" read ", with axillary tufts of hairsbeneath and sometimes villous along the veins"

624 under 3. Stewartia line 3 after "cup-shaped" insert "white"

625 under 2. S. koreana line 3 after "terminal" insert "Fl. VI-VII. H. B. 7:398."

626 before "Hypericum" insert "2."

line 5 from below for "11" read "13", line 4 for "12" read "14", line 2 for "13" read "12" and line 1 for "14" read "11"

630 under 16. line 11 after "Androsaemum" omit period

632 under 5. line 4 omit "nearly sessile" and line 7 after "rounded" insert "or slightly emarginate"

633 under 2. M. germanica line 4 for "long-acuminate below, with" read "long-acuminate, below with"

635 line 1 from below for "P. lV" read "P. IV"

637 under 4. for "L." read "Mill."

641 under Fam. 74. line 3 after "jointed," insert "more or less spiny,"

643 under BB. omit "brown"

648 under 3. Dirca line 2 after "leaf-fall" insert "terminal bud wanting"

649 under 1. S. canadensis line 6 for "Mich., Wisc." insert "Ohio, Ind."

650 under 2. line 1 for "argentea Pursh" read "commutata Bernh." and line 7 after "576" insert "(E. argentea Pursh, not Nutt.)"

652 under 1. Decodon for "L." read "Ell."

653 under Fam. 78. line 3 for "Punica" read "PUNICA"

658 under AA. for "valvate" read "imbricate"

under 1. Hedera line 5 after "berry" insert ", albumen ruminate"

659 under Var. taurica line 3 after "rays" insert "; fr. yellow"

under 3. line 1 for "japonica Tobl." read "rhombea Sieb. & Zucc."

660 line 1 for "rhombea Sieb. & Zucc." insert "japonica Tobl., not Jungh."

under 2. line 1 for "Echinopanax Done. & Planch." read "Oplopanax Miq."; line 7 for "Oplopanax Miq." read "Echinopanax Done. & Planch."

under E. horridus line 1 for "E." read "O." and for "Done. & Planch." read "Miq."; line 7 for "Oplopanax horridum Miq." read "Echinopanax horridus Done. & Planch."

under E. elatus line 1 for "E." read "O."

666 under 3. line 1 for "Aukuba" read "Aucuba"

667 under A. after "involucre" insert ", white"

670 under 11. line 1 for "femina Mill." read "stricta Lam." and line 7 for "C. stricta Lam." read "? C. femina Mill."

671 under 16. line 3 after "so" insert "and pale green"

673 line 1 for "Japan" read "Korea"
676 under BB. C. D. E. F. GG. H. I. JJ. for "5-merous" read "4-6-merous"
677 under 1,, T. bracteata line 4 before "Japan" insert "(Botryostege br. Stapf.)"
678 line 1 for "unknown" read "a 4-valved caps."
680 line 13 for "8-10" read "5-10"
681 under Subgen. III. Sect. 1. AA. BB. after "5" insert ", sometimes 6-10"
line 1 from below for "lutum" read "luteum"
682 under Sect. 1 for "Leiorhodium" read "Leiorhodion"
under 3 for "californicum Hook." read "macrophyllum G. Don", line 3 before "rosy-purple" insert "white to" and line 7 for "macrophyllum Don" read "californicum Hook."
line 3 and 4 from below change to "R. californicum is sometimes distinguished as a species by its rosy-purple fls. and smaller leaves"
683 under 7. line 5 for "6-7 cm." read "6-10 cm."
684 line 8 for "(R. praevernum Hutchins.)" read "—— R.praevernum Hutchins. is closely related to the preceding species but readily distinguished by the glabrous midrib."
under 8. line 4 after "fragrant" insert ", 7-9 cm. across"
685 under 11. line 1 for "Smirnovi" read "Smirnowii"
line 1 from below for "cult. in " read "of the n. alps of"
686 line 1 for "spontaneous form" read "more common form in Japan"
line 2 after "Maxim." insert "B. M. 8403. (R. Degronianum Carr.)"
line 4 before "R. stenophyllum" insert "R. Makinoi Tagg," and after "Makino" insert ", not Hook. f."
688 under 24. line 2 after "long," insert "slightly crenulate,"
689 line 8 after "Hort." insert "R. punctatum Hort., not Andr."
under 26. line 3 before "ciliate" insert "crenulate and"
690 under 30. line 5 after "long" insert "or shorter"
691 under 33. R. dauricum for "33" read "34"
under 33. Var. mucronulatum line 6 after "1882." insert "Probably better considered a distinct species."
692 under Subgen. II. for "Maxim." read "Planch."
under 34. R. albiflorum for "34" read "35"
under 34. R. semibarbatum line 2 for "ovate-lanceolate read "ovate-oblong"; line 4 after "stamens 5" insert ", 2 sterile with short pilose filaments, 3 fertile with long nearly glabrous filaments. BM. 9147 (c)." and for "Gt. 24:" read "Gt. 19:"
under 37 for "L" read "Sweet"
695 under 44. line 11 for "glandular" read "pubescent", and line 12 for "strigose or villous" read "villous or glandular or both"
under 44. Var. pentandrum omit "; ovary glandular; style glabrous"
696 line 2 after "t. 30" insert "(Azalea qu. Olmst., Cov. & Kelsey)"
under 48. R. nipponicum line 1 for "Makino" read "Matsum ." and line 2 for "sessile" read "subsessile"
698 under 53. line 3 after "oblanceolate" insert ", 4-12 cm. long"
699 line 3 omit "B. M. 180 (c). L. B. 624 (c)"
700 under 58. line 11 for "Torr." read "Sweet"

702 under 62. line 1 for kamtschaticum" read "camtschaticum", and line 7 after "57 (h)" insert "(Therorhodion c. Small)"
under 6. M. pilosa line 1 for "Pers." read "Juss."
703 under 8. line 1 after "Hedw." insert "f."
704 under 11. line 3 for "umbels" read "racemes"
line 3 from below for "Mountain Laurel" read "Mountain-Laurel"
705 under 2. line 4 for "umbels" read "racemes"
under 3. line 7 after "445, t (c)" insert "(Lambkill)"
706 under 2. P. Breweri line 2 after "corolla" **insert "rose-colored to purple, wide-campanulate,"**
under 13. line 3 for "stamens 4" insert "stamens 8"
707 line 4 for "Rehd" read "Rehd."
709 under 1. A. Polifolia after "L." insert "Bog-Rosemary"
711 under 19. line 9 after "sutures" insert "separating from the valves"
713 line 1 for "Oxydendron" read "Oxydendrum"
under 22. line 6 before "Including" insert "("
717 under 26. line 1 for "Arbùtus" read "Árbutus"
718 line 3 for "Unèdo" read "Unedo"
719 under 28. A. alpinus line 7 for "Lab." read "Nfdl."
720 line 12 for "Searlei" read "Serlei"
724 under A. B. CC. for "staminoum" read "stamineum"
line 2 from below for "7" read "9"
725 line 4 for "9" read "10"
line 5 for "10" read "7"
under 1 for "arbòreum" read "arbóreum"
727 under 9. line 8 for "Intr. 1765" read "Cult. 1656"
under 9. Var. pallidum line 2 after "serrulate" insert "corolla urceolate"
under 10. V. Dobbinii for "Dobbinii" read "Dobbini"
728 under 15. line 2 for "oblong-ovate, 1-3 cm." read "oblong-lanceolate, 1-5 cm.", and line 3 for "on both sides" read "above, paler beneath"
731 under D. lapponica line 1 for "5-15 cm." **read "5-15 mm."**
732 under A. japonica line 7 for "VII or VIII" read "(V)"
734 under 2. line 1 after "m.;" insert "bark furrowed;" and line 3 before "pubescent" insert "grayish or glaucescent and"
under 3. line 1 after "m.;" insert "bark scaly" and line 3 before "pubescent" insert "lighter green and"
735 under 1. S. paniculata for "Wall." read "Miq."
under 1. S. sinica for "sinica Ker." read "chinensis **Druce**" and after 710 (c) insert "(S. sinica Ker.)"
738 before "Halesia" insert "2." and line 3 after "season" insert ",white, rarely pale rose"
739 before "Pterostyrax" insert "3."
line 3 from below after "pinnate" insert ", exstipulate"
740 under F. Fortunei line 5 for "e-d" read "a-d"
741 line 6 for "6 mm." read "1.5 cm."
742 under 2. line 2 for "7, stalked" read "3 or 7, slender-stalked"
743 under 5. line 2 for "sessile" read "short-stalked"
744 under 9. line 3 before "crenate-serrate" insert "serrate to"
748 under 26. F. elonza line 1 for "gray-green" read "grayish or yellowish green"
750 under 3. Var. koreana line 6 before "Korea" insert (F. k. Nakai)"
751 under 5. line 10 for "Dodoens" read "Lobel"

751 under A. B. after "base" insert ", sometimes lateral in no. 5"
under BB. C. D. after "above" insert "(see also no. 12)"
752 under 2. line 8 for "before 1908" read "1906"
753 line 6 for "Cult. 1910" read "Intr. 1894"
under 6. line 9 omit "B. M. 8292 (c)" which represents S. Henryi, line 11 for "Intr. 1885" read "Cult. 1882"
under 8. line 11 for "1904" read "1901"
754 line 7 for "slightly warty" read "smooth"
under 10. S. Potanini line 4 after "pilose;" insert "anthers yellow"
under 10. S. pinetorum line 5 for "Introd. about 1915" read "Not yet intr."
under 11. line 9 for "1910" read "1902"
under 12. line 8 for "1914" read "1910"
755 under 16. line 8 for "affinis Lingelsh." read "alba Rehd."
under 16. S. hyacinthiflora Line 3 after "Giraldii" insert "and S. vulgaris"
756 line 2 for "1597" read "1563"
under 18. line 5 for "1883: 8" read "1883:80"
under 19. line 7 for "1640" read "1614"
under 21. line 6 omit "stamens about as long as limb"; line 8 omit "Ligustrina p. Reg." and for "1881" read "1880"
757 line 3 after "glabrous" unsert ",ciliolate"; line 4 and 5 omit "stamens almost twice as long as limb"
under 23. line 5 omit "stamens slightly longer than limb"
758 under O. ilicifolius line 1 for "Mouillef." read "Standish"
759 under C. virginica line 10 for "V" read "IV"
inder C. retusa line 1 after "Lindley" insert "& Paxt."
760 under A. BB. omit "(except in L. nepalense under no. 5)
761 under 3. Var. Stauntonii line 2 after "spreading" insert ";brts. less pubescent"
763 under 11. line 1 for "ibota Sieb. & Zucc.. not Sieb." read "ciliatum Bl."; line 7 for "ciliatum Sieb." read "ibota Sieb. & Zucc., not Bl."
765 under 4. line 3 after "acute" insert ", margin scabrate"
under 5. line 6 for "S. Eur., N. Afr." read "Mediterr."
under 6. line 8 after "Himal." insert "and China"
766 before "Gelsemium" insert "1."
under "G. sempervirens" line 1 for "Caroline" read "Carolina"
768 line 6 for "lanceolate" read "ovate-lanceolate" and for "doubly" read "unequally"
775 under Callicarpa line 5 after "exserted" insert ";anther-cells opening by a slit or apical pore"
776 under 3. line 1 for "Giraldiana Hesse" read Bodinieri Levl. var. Giraldii Rehd."
under 4. line 7 for "alba Rehd." read "lactea F. J. Muller"
777 under C. trichotomum line 7 after "across," insert "white,"
778 line 1 for foetidum Bge." read "Bungei Steud."
line 3 after "across" read "; sepals triangular-ovate, acute"
line 4 for "Bungei Steud." read "C. foetidum Bge."
under C. incana line 3 after "above" insert "veins ending in the teeth", line 5 after "outside" insert "; ovary pubescent"
under C. tangutica line 3 after "2-lipped" insert"; ovary glabrous"

778 line 4 from below for "Saturja" read "Satureja"
783 line 10 after "1600 (c)." insert "(Climbing Nightshade)"
784 under L. ruthenicum line 3 for "Miers." read "Miers,"
785 under "P. Newberryi" line 3 after "acuminate" insert "stamens slightly exserted"
line 3 from below for "3" read "2"
786 under 2. Paulownia line 2 after "lobed" read "toothed on young seedling plants"
787 under 3. Veronica line 7 after "Veronica" insert "or misprint for Betonica"
under AA. B. CC. DD. for "amplexicaule" read "amplexicaulis"
789 under B. capreolata line 8 for "1700" read "1664"
790 under 1. line 8-9 for "Intr. 1640" read "Cult. 1623"
under 2. C. hybrida line 1 for "hybrida Zabel" read "Tagliabuana Rehd."
797 under 3. line 5 before "B. C." insert "(S. glauca Nutt.)"
under 5. S. gallicarpa line 1 after "lfts." insert "usually 7"
798 under 7. line 10 for "Bernh." read "Torr. & Gr."
line 5 from below after "44" insert ", sometimes paniculiform in no. 5"
799 under BB. CC. omit "tomentum not stellate"
line 12 from below after "blue-black" insert "stone"
line 10 from below after "globose-ovoid," insert "stone"
800 under 1. line 9 for "1915" insert "1910"
801 line 6 for "Zone V" read "Zone IV"
802 under 9. line 1 for "shensianum" read "schensianum"; line 8 for "across" read "long"
807 under 29. line 8 after "Japan" add ", Korea, China"
under 31. line 11 after "Zone V" add "-Probably not specifically distinct from the preceding species."
808 under 34. line 8 after "Japan" insert ", China"
809 under 39. line 7 for "Iowa" read "Ind."
line 4 from below after "Raf." add "Wooseberry."
810 line 4 from below for "L." read "Juss."
811 under AA. omit "glabrous inside"
812 line 3 from below after "tube" insert ", glabrous inside"
814 under 2. line 8 after "1915." add "Zone VII or VIII."
818 under 9. line 9 for "D" read "D."
819 line 1 for "4 x 6" read "4 x 9"
line 5 for "4 x 8" read "4 x 6"
line 9 for "6 x 7" read "9 x 7"
line 10 for "6 x 8" read "9 x 6"
line 12 for "7 x 8" read "7 x 6"
820 under BB. C. D. E. for "16" read "17"
under BB. C. D. EE. for "17" read "18"
below BB. C. DD. replace lines under E. and EE. by the following lines:

E. Ovaries more or less connate.
F. Lvs. acuminate; brts. setose .....19. L. Standishii
FF. Lvs. acute to obtusish; brts. glabrous.
20. L. fragrantissima
EE. Ovaries distinct..... 21. L. Altmannii

under BB. CC. DD. E. after "fr. red" insert ", rarely whitish"

821 under BB. C. D. E. for "41" read "51"
under BB. C. DD. for "4-6" read "4-8"
824 under 11. line 3 after "first" insert "or glabrous"; line 10 for "1824" insert "1641"
825 under 15. line 3 after "obtusish" insert ", cuneate at base"
826 under 17. line 2 after "brts." insert "usually"
830 line 6 from below for "sachalinensis" read "sacchalinensis"
835 under 48. line 4 before "above" insert "and somewhat rugulose"
under 49. line 4 after "green" insert "and smooth above"
837 under 53. Var. Delavayi line 2 after "lvs." insert ", corolla to 8 cm. long"
839 under 60. line 9 for "1776" read "1636"
844 before "Microglossa" insert "4."
847 under 3. line 1 for "Sprenger" read "Matsum."
849 under P. sinensis line 6 for "Zone I" read "Zone V"
854 under papillose for "nibble-shaped" read "nipple-shaped"
855 below Stipel insert "Stipellate. Having stipels."
857 line 3 for "Lelandii" read "Leylandii"
under Page 52. line 2 for "Pilger" read "Litvin."
under Page 153. line 2 for "C. spinescens = Rehd." read " = C spinescens Rehd."
859 under Page 660. line 1 for "Echinopanax" read "Oplopanax"; line 2 for "E." read "O."
861 under Abies below "Fraseri" insert "Gmelini, 857"
864 below Alnus insert "acuminata, 146"
866 under Apocynaceae for "269" read "769"
867 below Bambusa nana insert "reticulata, 74"
868 under Berberis buxifolia for "337" read "237"
under Berberis empetriformis for "empetriformis" read "empetrifolia"
Berberis Prattii place below "Potanini" and omit "polyantha" above "Prattii"
870 Bladhia japonica change to italics
872 Caryocedrus below Cayratia transfer to col. 1 before Caryophyllaceae
under Castanopsis change "Henryi" to italics
873 under Cercidiphyllum for "sinicum" read "sinense"
874 "Chamaerops" below Chamaecerasus transfer below Chamaedryon
877 under Cotoneaster racemiflora for "songarica" read "soongorica"
878 under Crataegus pentagyna change "Oliveriana" to roman letters.
882 under Elaeagnus change "hortensis" and "hortensis spinosa" into italics
below Elaeagnus umbellata parvifolia insert:
Elder, 795
American, 796
European, 796
European Red, 797
Red-berried, 798
883 under Exochorda for "Korolkovii" read "Korolkowii"
884 under Fagus change "americana" into italics
under Fendlera Wrightii for "282" read "281"
885 change Fremontia californica to roman letters

887 under Halesia change "corymbosa" into italics
under Halesia monticola vestita for "738" read "739"
888 under Holly for "Hedgehook" read "Hedgehog"
890 under Itea for "virginiana" read "virginica"
891 under Juniperus for "montana" read "nana"
892 under Laburnum anagyroides for "quercifoliun" read "quercifolium"
Leycesteria change into roman letters
894 under Lonicera for "Korolkovii" read "Korolkowii"
895 under Lycium for "rhutenicum" read "ruthenicum"
under Magnolia for "Halleana" read "Halliana"
897 for "Neviusa" read "Neviusia"
898 under Ornus change "europaea" into italics
899 change "Pavia" into italics
below "Pavia rubra humilis pendula" insert "Pawpaw, 263"
903 under Pinus for "Thunbergiana" read "Thunbergii"
904 under Polygonum for "Auberti" read "Aubertii"
905 under Prunus for "canascens" read "canescens"
under Prunus Cerasus Juliana for "472" read "471"
906 under Prunus for "martima" read "maritima"
907 under Pseudolarix for "amabilia" read "amabilis"
908 under Pyrus Michauxii for "403" read "404"
910 under Quercus for "Prinos" read "Prinus"
914 under Ribes robustum for "310" read "311"
915 under Rosa centifolia for "446" read "436"
922 under Spiraea microthyrsa for "341" read "344"
924 under Syringa oblata for "affinia" read "affinis"
under Syringa change "Wilsonii" into italics
928 under Viburnum alnifolium for "808" read "803"
under Viburnum tomentosum for "lanceolatum" read "lanceatum"
929 under Wellingtonia gigantea for "36" read "26"
930 Wisteria change into italics

MANUAL OF CULTIVATED TREES AND SHRUBS

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MANUAL OF CULTIVATED TREES AND SHRUBS

Hardy in North America

EXCLUSIVE OF THE SUBTROPICAL
AND WARMER TEMPERATE REGIONS

By
ALFRED REHDER
ARNOLD ARBORETUM, HARVARD UNIVERSITY

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To

Charles Sprague Sargent, LL.D.

WHO DURING MORE THAN FIFTY YEARS AS DIRECTOR
OF THE ARNOLD ARBORETUM HAS WORKED WITH UNTIRING
ZEAL AND ENERGY FOR THE PROMOTION OF AMERICAN DENDROLOGY
AND ARBORICULTURE AS A TOKEN OF ADMIRATION
AND GRATITUDE THIS VOLUME IS DEDICATED

36239

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INTRODUCTION

The object of this volume is to present a systematic and descriptive enumeration of the cultivated trees and shrubs hardy in North America exclusive of the subtropical and warm-temperate regions and to facilitate their identification by means of analytical keys. The whole plan and arrangement of the work is very much the same as that of the manuals of the spontaneous flora of that region to which it may serve as a supplement and companion dealing with the cultivated ligneous flora which in an ever-increasing way is going to supply economic and esthetic wants and to modify thereby greatly the aspect of the original vegetation wherever man is making his home.

The term trees and shrubs is here taken in a wide sense, so as to include not only woody vines, but also suffruticose plants, that is, plants of which only the lower part of the stems and branches persists and becomes woody, while the upper part dies back annually, or which have stems persisting for several years without becoming truly ligneous. The distinction between a suffruticose plant or subshrub and a perennial plant, however, is not always perfectly clear and definite, but in doubtful cases plants only slightly woody have been included rather than excluded, particularly if they belong to a genus or family otherwise not represented. It is the intention to treat in this book all woody plants known to be at present in cultivation and hardy or supposed to be hardy within an area whose southern limit is an isothermal line connecting points with the mean temperature of the coldest month near the freezing point; this corresponds approximately to a line running from Virginia through western North Carolina, northern Georgia and northern Alabama, central Arkansas, central New Mexico, central Arizona and then northward through northeastern California and Oregon along the western slope of the Cascade Mountains to northwestern Washington. In the East the area coincides almost with that of the manuals of Gray and of Britton. Whether a plant is at present in cultivation or not is often impossible to say with certainty; though we have the record of its introduction into American or European gardens, it may not have persisted, but as a rule woody plants known to have been successfully introduced, particularly in more recent times, have found

a place in this book. It has been, however, found necessary, in order not to exceed the limits of a single volume, to omit less known and rarely cultivated varieties and garden forms; likewise in some large genera as Salix, Crataegus, Rubus and Rosa species of neither economic nor horticultural importance, and not met with except in a few special collections, have not been mentioned. As these omitted species are almost exclusively those native to America, their descriptions can be found in most cases readily in American manuals and floras; foreign species, even if but rarely cultivated, are usually mentioned, since information regarding these is not so easily obtainable.

The trees and shrubs described in this book belong to 468 genera distributed among 112 families. The number of species fully described and represented in the keys is about 2350 with about 2465 varieties. Besides these there are 1 family, 30 genera, 1265 species and 507 hybrids only briefly described or mentioned and appended to the families, genera and species to which they are most closely related, or in the case of hybrids, to one of the parents. This cultivated ligneous flora is chiefly composed of plants introduced from the temperate and colder regions of the northern hemisphere: of the southern hemisphere only few plants from the extreme southern part of South America and the higher altitudes of the Andes and from the high mountains of Australia and New Zealand have proved hardy within our area. A large percentage of this flora is native within our area and in the adjoining regions to the south. Perhaps an equal number we owe to eastern and central Asia, which has a very rich and varied ligneous flora. Less numerous are the contributions from Europe, western Asia and North Africa and, as stated before, only few plants from the southern hemisphere will thrive within our area. In addition to the introduced species and varieties a large and ever-increasing number of hybrids and garden forms has originated under cultivation and in many cases supplanted the original species in our gardens. Most of the foreign trees and shrubs and even some native ones have reached our gardens by the way of Europe and it is only within the last 50 years that, chiefly through the agency of the Arnold Arboretum, many plants have been introduced from their native country, mostly from eastern Asia, directly to American gardens. Lack of space forbids to give in this book details regarding the introduction and only the year, if known, is given; when this could not be ascertained, the first record of the plant as being in cultivation is given, based either on mention in horticultural literature or on dated herbarium specimens. As

the most complete and reliable records regarding the introduction of plants into cultivation are found in English horticultural literature, most dates, particularly those of older introductions, refer to England, though in many cases the plants may have been in cultivation earlier on the continent of Europe or in this country.

The sequence of the families is according to the system used by Engler and Prantl in their "Natürliche Pflanzenfamilien" and in Engler's Syllabus, which is the system followed with slight modifications by all modern American manuals. The descriptions are as concise as possible without omitting important matter and in most cases characters used in the keys, and particularly in the shorter keys where the species can be referred to readily, are not repeated. The hybrids, with the exception of a few horticulturally important and much cultivated hybrids, are not fully described, as they are usually very variable and should be recognized chiefly by their resemblance to the parents; they are only briefly characterized and appended to one of the parents with a reference from the other parent. In using the keys to the families and genera it should be understood that the characters apply only to those genera of the families and those species of the genera which are described in this book, while the descriptions refer to the whole of these groups.

The International Rules of botanical nomenclature have been followed and therefore the names agree, with few exceptions, with those used in Bailey's Standard Cyclopedia of Horticulture and in his Manual of cultivated plants, in Gray's Manual, seventh edition by Fernald and Robinson, and in the second edition of Sargent's Manual. There are, however, two instances where established usage has been followed rather than the rules. One is the use of special generic names for intergeneric hybrids, which seems only logical, as long as names corresponding to specific names for hybrids between species are allowed by the International Rules, and which was furthermore sanctioned by the International Horticultural Congress at Brussels in 1910, when a set of rules relating to horticultural nomenclature and supplementary to the International Rules was proposed and voted upon. The other instance is the use of the term "var." for any subdivision below the species, regardless whether it was originally described as subspecies, varietas, forma, lusus, etc. In monographs and similar taxonomic publications it is no doubt desirable, and in the case of polymorphic species often necessary, to distinguish subdivisions of different rank and subordinate to each other, but for the designation of any form below the species, three names should

be sufficient, as is implied by Article 29 of the International Rules. Instead of using the term "var." this third name may be joined directly to the specific name, e.g., *Prunus subhirtella pendula* instead of *P. subhirtella* var. *pendula*. In some cases the varietal designation for horticultural forms consists of two names and, though this is against the rules, these names have been preserved to avoid the coining of a new name: e.g., in *Chamaecyparis pisifera plumosa aurea* the word *plumosa* cannot be dropped, as there exists already a *C. pisifera aurea*. Such names are distinguished by quotation marks, *C. pisifera "plumosa aurea"* to indicate that they do not represent a correct botanical combination, but are taken over from horticultural usage.

The authorities for botanical names are cited as customary in abbreviated form and the explanation for these abbreviations will be found on pp. xvii to xxi. Double citation is not employed in this book; this is often used to indicate that in a combination of names the name of the species or variety did not originate with the author, but was taken from an older combination, as, e.g., in *Malus baccata* (L.) Borkh., the species-name having been transferred by Borkhausen from *Pyrus baccata* of Linnaeus. Though double citation indicates that a species or variety had been described before, it makes no difference in regard to the responsibility for the accepted combination and it does not show under which genus the original name was published or whether it was originally the name of a species or variety. As the authority of varietal names the author who first placed the name under the correct and accepted binomial, that is the combination of the generic and specific name, is cited, regardless whether he published it as a subspecies, variety, forma, lusus, etc. As it does not really change the combination of names if, e.g., a variety of *Rhododendron viscosum* is called var. *nitidum* by Gray or forma *nitidum* by Voss, the resulting combination being in either case *R. viscosum nitidum*, it seems impracticable and unnecessary to consider this slight difference in the valuation of the grade of variation as constituting different combinations which call for citation of different authorities; this will only complicate nomenclature and under certain circumstances will establish different names for the same plant, if one author calls it a variety and another a forma. Such information has its proper place in detailed taxonomic work where full citation of literature and synonomy is given. As it is not only desirable but for the sake of clearness necessary to give a definite author citation for each accepted name, the citation "Hort.," which does not connect the name with a published description and leaves it vague and

indefinite, has been always replaced by the author who validated the name by description and publication, or in a few cases when the name appeared anonymously in a periodical, the periodical is cited as authority, as, e.g., in *Pyracantha crenulata* var. *flava* Gard. Chron.; only in the case of unimportant synonyms the citation Hort. has been allowed to stand.

The original orthography of the names has been preserved except in cases of an actual error or misprint. Also the genitive ending of personal names, whether single or double *i*, is given as originally published, though for practical reasons uniformity may be preferable, as it seems an unnecessary burden on the memory to remember that one and the same name may sometimes end in a single and sometimes in a double *i*, as in *Viburnum Sargenti* Koehne and *Populus Sargentii* Dode, or in *Picea Engelmanni* Engelm., and *Cirsium Engelmannii* Rydb. Therefore it would seem wise to accept as a guide the recommendation of the International Rules to double the *i* in all cases except in the words ending in *er*, but this is only a recommendation and not a rule, and therefore, according to a strict interpretation of the International Rules, not retroactive. To Christian names, of course, which have a recognized Latin form, as Augustinus, Armandus, this recommendation can not be applied, and these names should have always a single *i* in the genitive ending.

As an aid to the correct pronunciation, the botanical names are marked with accents, the grave (`) to indicate the long sound of the vowel, the acute (´) to indicate the short sound. The rules of Latin quantity have been followed as closely as possible in the accentuation of the words and in the latinized forms of proper names and other words unknown to classical Latin established custom has served as a guide. In the genitive ending of personal names the penultimate vowel has been usually treated as long except in the English and German ending *er*, e.g., Pàlmeri, Éngleri, but Berlandièri, since in the French name Berlandier the last syllable is long and accented.

Only the more important synonyms are cited and chiefly those which occur frequently in horticultural and botanical literature. Of English names only those are given which are in actual use and no attempt has been made to provide the less known and recently introduced plants with newly coined English names which would have only occupied valuable space to little purpose. It has, however, seemed desirable to give some space to the citation of illustrations; if possible the references are to the most easily accessible works and only in cases when no other illustrations were available, rare

and little known publications are cited. Usually several illustrations are quoted which include colored plates and habit figures. These citations will also serve in most cases as a guide to further information and to citation of literature.

Within the limits of one volume only very brief notes on the economic and ornamental properties of the trees and shrubs described could be given, and cultural directions had to be restricted to short hints in the case of such plants which can not be expected to thrive under ordinary conditions and to the indication of the approximate hardiness of each species and in some instances of varieties. To this end the area has been divided into eight climatic zones characterized by a difference of from 5 to 5 degrees in the lowest mean temperature of the coldest month. These zones run nearly parallel to the southern boundary of the area as described above, but their boundaries are much modified by elevation, mountains, river valleys and other features, and often form considerable curves or loops; as a rule they tend to curve from the Atlantic coast southward, but beyond the 110° W. L. they turn rather abruptly northward and run for some distance almost parallel to the Pacific coast, reaching here much farther to the north than on the Atlantic coast. A map showing these eight zones will be found on p. xxvii, and with its help it can be easily ascertained to which zone a certain region belongs and consequently which trees and shrubs described in this book may be expected to grow there. There are, however, many other factors besides temperature in winter which will influence the hardiness and growth of certain plants, as soil, its physical as well as chemical composition, exposure, rainfall, humidity of the air, shelter from cold winds. As a rule one may say that plants stand cold better in a drier situation than in a wet one and that deciduous trees and shrubs prove hardier in a more exposed situation and in climate with higher summer temperature, while evergreen plants prefer a sheltered situation, and like a more humid climate and less extreme summer and winter temperatures; for this reason many deciduous species grow best in the East, while evergreen plants and particularly broad-leaved evergreens, will do better on the Pacific coast. Of many trees and shrubs not hardy in the Arnold Arboretum, owing to the lack of arboreta and botanic gardens with large collections of woody plants farther south, the limit of hardiness is not or only imperfectly understood and had to be deduced from their behavior under approximately similar climatic conditions in Europe. A few examples of trees and shrubs characteristic for each zone as reaching there their northern limit

of hardiness are given here. Zone VIII: Albizzia julibrissin, Lagerstroemia indica, Firmiana simplex. Zone VII: Magnolia grandiflora, Abelia grandiflora. Zone VI: Paulownia tomentosa, Poncirus trifoliata. Zone V: Koelreuteria paniculata, Fagus sylvatica, Ilex opaca. Zone IV: Cercidiphyllum japonicum, Robinia pseudoacacia, Quercus coccinea. Zone III: Fraxinus americana, Sorbus aucuparia, Berberis Thunbergii. Zone II: Viburnum Lantana. Zone I: Quercus macrocarpa, Acer Negundo, Caragana arborescens, Syringa vulgaris.

Under favorable conditions plants will survive in localities farther north than the zone to which they have been referred, but these exceptions should not change the indication of the proper zone. Such cases have often been indicated by placing the zone in which the plant is not fully hardy in parenthesis, e.g., Zone (V) VI, which indicates that the plant is only precariously or under particularly favorable conditions hardy in Zone V, but fully hardy in Zone VI.

As in most modern American floras the measurements are given in the metric system, which is understood the world over, and, moreover, permits, particularly for smaller dimensions, a more exact and clearer designation than the various fractions into which an inch may be divided and which may not be indicated on the ruler at hand. Equivalents of the Metric and English systems of measurements and comparative scales of centimeters and inches are given on p. xxvii.

It is hoped that the keys will lead in most cases to the identification of the plant under consideration, but sometimes it may not be possible to arrive at a satisfactory conclusion, when either the material at hand is imperfect, or the plant represents some abnormal feature, or is very rare and only incidentally mentioned in the book or not at all. The author will be glad to identify specimens sent to him, but requests to send as representative and sufficient material as possible. In order that the specimen may arrive in good condition they should be sent, if they are dried herbarium specimens, between stiff cardboards and firmly tied, not between corrugated paper or thin flexible cardboards. If fresh specimens are sent, they are best put singly between sheets of paper (any newspaper will do), and then placed flat between cardboards; only if the distance is short and the specimens are not very delicate, they may be sent loose in a box. Labels stating the source of the plants and any characteristics not readily seen in the specimen itself, as habit and size, color, fragrance, etc., should accompany the specimens. The author also will deem it a

favor if he is informed of any errors, omissions or inaccuracies found in this book, so that, if ever another edition should be necessary, it will be a thoroughly revised and improved one. He hopes that the book, in spite of its imperfections, will serve the purpose for which it was written and will help to spread a more accurate knowledge of the wealth of trees and shrubs now at our command, and thus will constitute a welcome contribution to botany and horticulture.

Arnold Arboretum,
Jamaica Plain, Mass.
September, 1926

ALFRED REHDER

ABBREVIATIONS OF AUTHORS' NAMES

ADANS.—Adanson, Michel; 1727–1806.
AIT.—Aiton, William; 1731–1793.
AIT., F.—Aiton, William Townsend, the son; 1766–1849.
ALEF.—Alefeld, Friedrich; 1820–1872.
ALL.—Allioni, Carlo; 1725–1804.
ANDERS.—Andersson, Nils Johan; 1821–1880.
ANDERS., T.—Anderson, Thomas; 1832–1870
ANDR.—Andrews, Henry C.; 17. .–1828
ANDRÉ—André, Édouard; 1840–1911.
ANT.—Antoine, Franz; 1815–1886.
ARCANG.—Arcangeli, Giovanni; 18. .–1922.
ARMSTR.—Armstrong, J. B.; wrote about 1880–85.
ARN.—Arnott, George Arnott Walker; 1799–1868.
ARNOLD—Arnold; wrote about 1785.
ASCHERS.—Ascherson, Paul Friedrich August; 1834–1913.
ASHE—Ashe, William Willard; contemp.
AUBL.—Aublet, J. B. C. F.; 1720–1778.
AUDIB.—Audibert (nurserymen; about 1810–1830).
AUTH.—Authors; referring to usage by various authors.

BAB.—Babington, Charles Cardale; 1808–1895.
BABCOCK—Babcock, Ernest Brown; contemp.
BAILEY—Bailey, Liberty Hyde; contemp.
BAILL.—Baillon, Henri Ernest; 1827–1895.
BAKER—Baker, John Gilbert; 1834–1920.
BAKER, E. G.—Baker, Edmund Gilbert, the son; contemp.
BALF., J. B.—Balfour, Isaac Bailey; 1853–1922.
BALL—Ball, Carlton Roy; contemp.
BARRAT—Barrat, Josef; 1797–1882.
BARTL.—Bartling, Friedrich Gottlieb; 1798–1875.
BARTR.—Bartram, William; 1739–1823.
BATAL.—Batalin, Alexander; 1847–1898.
BATSCH—Batsch, August Johann Georg Karl; 1761–1802.
BEAN—Bean, William J.; contemp.
BEAUV.—Beauvois, A. M. F. J. Palisot de; 1755–1820.
BEBB—Bebb, Michael Schuck; 1833–1895.
BENTH.—Bentham, George; 1800–1884.
BECHST.—Bechstein, Johann Matthaeus; 1757–1822.
BECK—Beck von Mannagetta, Guenther; contemp.
BEISS.—Beissner, Ludwig; contemp.
BENTH.—Bentham, George; 1800–1884.
BENTH. & HOOK.—Bentham, George; Hooker, J. D.
BERGER—Berger, Alwin; contemp.
BERL.—Berlandier, Jean Louis; 180.–1851.
BERNH.—Bernhardi, Johann Jacob; 1774–1850.
BERT.—Bertero, Carlo Guiseppe; 1789–1831.
BESS.—Besser, Wilibald Swibert Joseph Gottlieb; 1784–1842.
BIEB.—Bieberstein, Friedrich August, Marschall von; 1768–1826.
BIGEL.—Bigelow, Jacob; 1787–1879.
BGE.—Bunge, Alexander von; 1803–1890.
BL.—Blume, Karl Ludwig; 1796–1862.
BOCQ.—Bocquillon, Henri T.; 1834–?
BOENN.—Boenninghausen, Clemens Maria Friedrich; 1785–1864.
BOIS—Bois, Desirée Georges Jean Marie, contemp.
BOISS.—Boissier, Edmond; 1810–1886.
BONPL.—Bonpland, Aimé Jacques Alexandre; 1773–1858.
BORB.—Borbas, Vincenz von; 1844–1905.
BORKH.—Borkhausen, Moriz Balthasar; 1760–1806.
BORNMUELL.—Bornmueller, J.; contemp.
BOSC—Bosc, Louis Augustin Guillaume; 1759–1828.
BOYNT.—Boynton, Frank Ellis; contemp.
BR., A.—Brown, Alexander; 1805–1877.
BR., H.—Braun, Heinrich; 1851–1920.
BR., N. E.—Brown, Nicholas E.; contemp.
BR., P.—Brown, Patrick; 1720–1790.
BR., R.—Brown, Robert; 1773–1858.
BRAND—Brand, August; 1863–1917.
BRIQ.—Briquet, John Isaac; contemp.
BRIT.—Britton, Nathaniel Lord; contemp.
BRONGN.—Brongniart, Adolphe Theodore; 1801–1876.
BROT.—Brotero, Felix de Avellar; 1744–1828.
B.S.P.—Britton, N. L.; Sterns, Emerson Ellick, contemp.; Poggenberg, Justus Ferdinand; 1840–1893.
BUCH.-HAM.—Buchanan, Francis, later Lord Hamilton; 1762–1829.
BUCKL.—Buckley, Samuel Botsford; 1809–1884.
BUR.—Bureau, Edouard; 1830–1918.
BURK.—Burkill, Isaac Henry; contemp.
BURGSD.—Burgsdorf, Friedrich August Ludwig von; 1747–1802.
BURM.—Burmann, Johannes; 1706–1779.
BURM., F.—Burmann, Nicolaus Laurens, the son; 1734–1793.
BUSH—Bush, Benjamin Franklin; contemp.
BUTLER—Butler, Bertram Theodore; contemp.

CALLIER—Callier, Alfons; contemp.
CAMUS, A.—Camus, Aimée; contemp.
CAMUS, E. G.—Camus, Edmond Gustave; contemp.
CARR.—Carrière, Elie Abel; 1816–1896.
CASP.—Caspary, Johann Xaver Robert; 1818–1887.
CASS.—Cassini, Alexandre Henri Gabriel; 1781–1832.
CAV.—Cavanilles, Antonio José; 1745–1804.
CELAK.—Celakovski, Ladislav Josef; 1834–1902.
CHAM.—Chamisso, Adalbert von; 1781–1838.
CHAMBRAY—Chambray, Georges de; wrote about 1844–47.
CHAPM.—Chapman, Alvan Wentworth; 1809–1899.
CHEESEM.—Cheeseman, Thomas Frederick; 1846–1923.
CHEVAL.—Chevalier, Auguste; contemp.
CHOIS.—Choisy, Jacques Denis; 1799–1859.
CHRIST—Christ, Hermann; 1833–1921.
CLARKE—Clarke, Charles Baron; 1832–1906.

CLEMENTI—Clementi, Guiseppe; 1812–1873.
COSS.—Cosson, Ernest St.-Charles; 1819–1889.
COULT.—Coulter, John Merle; contemp.
COV.—Coville, Frederick Vernon; contemp.
CRANTZ—Crantz, Heinrich Johann Nepomuk von; 1722–1797.
CRÉP.—Crépin, François; 1830–1903.
CUNNINGH.—Cunningham, Allan; 1791–1839.
CURT.—Curtis, William; 1746–1799.
CURT., M. A.—Curtis, Moses Ashley; 1808–1872.

DALLIM.—Dallimore, William; contemp.
DANIEL—Daniel, Lucien; contemp.
DC.—De Candolle, Augustin Pyramus; 1778–1841.
DC., A.—De Candolle, Alphonse; the son; 1806–1893.
DCNE.—Decaisne, Joseph; 1809–1882.
DESF.—Desfontaines, Réné Louiche; 1750–1833.
DESMOUL.—Desmoulins, Charles; 1797–1875.
DESROUSS.—Desrousseaux, Louis Auguste Joseph; wrote about 1790.
DESV.—Desvaux, Augustin Nicaise; 1784–1856.
DIECK—Dieck, Georg; 1847–1926.
DIELS—Diels, Ludwig; contemp.
DIETR.—Dietrich, Friedrich Gottlieb, 1768–1850.
DIETR., A.—Dietrich, Albert; 1795–1856.
DIETR., D.—Dietrich, David Nathanael Friedrich; 1799–1888.
DIPP.—Dippel, Ludwig, 1827–1914.
DODE—Dode, Louis Albert; contemp.
DOERFL.—Doerfler, Ignaz, contemp.
DON—Don, George; 1798–1856
DON, D.—Don, David; 1799–1841.
DONN—Donn, James; 1758–1813.
DOUGL.—Douglas, David; 1799–1834.
DUCHARTRE—Duchartre, Pierre Etienne Simon; 1811–1894.
DUHAM.—Duhamel du Monceau, Henri Louis; 1700–1781.
DUM.-COURS.—Dumont de Courset, Georges Louis Marie; 1746–1824.
DUMORT.—Dumortier, Barthelemy Charles; 1797–1887.
DUNAL—Dunal, Michael Felix; 1789–1856.
DUNN—Dunn, Stephen Troyte; contemp.
DURAND—Durand, Elias Magloire; 1794–1873.
DURAZZ.—Durazzini, Antonio; wrote about 1772.
DUTHIE—Duthie, John Firminger; 1845–1922.

EASTW.—Eastwood, Alice; contemp.
EAT.—Eaton, Amos; 1776–1842.
EGGL.—Eggleston, Willard Webster; contemp.
EHRH.—Ehrhart, Friedrich; 1742–1795.
ELL.—Elliott, Stephen; 1771–1830.
ELLIS—Ellis, John; 1710–1776.
ELLW. & BARRY—Ellwanger, George; 1816–1906; Barry, Patrick, 1816–1890.
ENDL.—Endlicher, Stephan Ladislaus; 1804–1849.
ENGELM.—Engelmann, George; 1809–1884.
ENGL.—Engler, Heinrich Gustav Adolph; contemp.
ENGL., V.—Engler, Victor, 1885–1917.
ESCH.—Eschscholtz, Johann Friedrich; 1793–1831.

FARR—Farr, Edith May; contemp.
FARWELL—Farwell, Oliver Atkins, contemp.
FEDDE—Fedde, Friedrich Karl Georg; contemp.
FEDTCH.—Fedtchenko, Boris Aleksyevitch; contemp.
FENZL—Fenzl, Eduard; 1808–1879.
FERN.—Fernald, Merritt Lyndon; contemp.
FINET & GAGNEP.—Finet, Achille; 1863–1913; Gagnepain, F.
FISCH.—Fischer, Friedrich Ernst Ludwig von; 1782–1854.
FISCH. & MEY.—Fischer, F. E. L. von; Meyer, C. A.
FOCKE—Focke, Wilhelm Olbers; 1834–1922.
FORB.—Forbes, James; 1773–1861.
FORSK.—Forskål, Pehr; 1738–1768.
FOUCAUD—Foucaud, Julien; 18. .–1904.
FOUG.—Fougeroux, Auguste Denis; 1732–1789.
FRANCH.—Franchet, Adrien; 1834–1900.
FRANCH. & ROCHEBR.—Franchet, A.; Rochebrune, Alphonse F. de; 1834–1912.
FREYN—Freyn, Joseph; 1845–1903.
FREYN & SINT.—Freyn, J.; Sintenis, Paul; 18. .–1907.

GAERTN.—Gaertner, Joseph; 1732–1791.
GAGNEP.—Gagnepain, François; contemp.
GAND.—Gandoger, Michel; contemp.
GATT.—Gattinger, August; 1825–1903.
GAUD.—Gaudin, Jean François Gottlieb Philippe; 1766–1833.
GILIB.—Gilibert, Jean Emmanuel; 1741–1814.
GLEDITSCH—Gleditsch, Johann Gottlieb; 1714–1786.
GMEL.—Gmelin, Samuel Gottlieb; 1743–1774.
GOEPP.—Goeppert, Heinrich Robert; 1800–1884.
GOMBOCZ—Gombocz, Endre; contemp.
GORD.—Gordon, George; 1806–1879.
GRAB.—Grabowski, Heinrich Emanuel; 1792–1842.
GRAEBN.—Graebner, Paul; contemp.
GRAY—Gray, Asa; 1810–1888.
GRAY, S. F.—Gray, Samuel Frederick; 1780–1836.
GREENE—Greene, Edward Lee; 1842–1915.
GREENM.—Greenman, Jesse More; contemp.
GREN.—Grenier, Jean Charles Marie; 1808–1875.
GREN. & GODR.—Grenier, J. C. M.; Godron, Dominique Alexandre; 1807–1880.
GRIFF.—Griffith, William; 1810–1845.
GRISEB.—Grisebach, Heinrich Rudolph August; 1814–1879.
GROSSER—Grosser, Wilhelm, contemp.

HAND.-MAZZ.—Handel-Mazzetti, Heinrich von; contemp.
HARDW.—Hardwicke, Thomas; 17. .–1835.
HARMS—Harms, Hermann; contemp.
HARROW—Harrow, R. L.; contemp.
HARTM.—Hartman, Carl Johan; 1790–1849.
HARTW.—Hartweg, Karl Theodor; 1812–1871.
HARTW. & RUEMPL.—Hartwig, A. K. J.; Ruempler, T.
HARTWIG—Hartwig, August Karl Julius; 1823–1913.
HASSK.—Hasskarl, Justus Carl; 1811–1894.
HAUSSKN.—Haussknecht, Heinrich Carl; 1838–1903.
HAWORTH—Haworth, Adrian Hardy; 1768–1833.
HAYATA—Hayata, Bunzo; contemp.
HAYEK—Hayek, August; contemp.
H.B.K.—Humboldt, F. W. H. A. von; Bonpland, A. J. A.; Kunth, C. S.
HEDL.—Hedlund, Johan Theodor; contemp.
HELLER—Heller, Amos Arthur; contemp.
HEMSL.—Hemsley, W. Botting; 1843–1924.

HENK. & HOCHST.—Henkel, Johann Baptist; 1815–1871; Hochstetter, Wilhelm; 1825–1881.
HENRY—Henry, Augustine; contemp.
HENRY, L.—Henry, Louis; contemp.
HICKEL—Hickel, Robert; contemp.
HOCHST.—Hochstetter, Christian Friedrich; 1787–1860.
HOESS—Hoess, Franz; wrote about 1830.
HOFFM.—Hoffman, Georg Franz; 1761–1826.
HOFFMANNS.—Hoffmannsegg, Johann Centurius von; 1766–1849.
HOOK.—Hooker, William Jackson; 1785–1865.
HOOK. & THOMS.—Hooker, J. D.; Thomson, Thomas; 1817–1878.
HOOK., F.—Hooker, Joseph Dalton, the son; 1817–1911.
HOOPES—Hoopes, Josiah; 1832–1904.
HORAN.—Horaninow, Paul; 1796–1866.
HORNIBR.—Hornibrook, Murray; contemp.
HORT.—Hortorum or hortulanorum; of gardens or gardeners.
HOST—Host, Nicolaus Thomas; 1761–1834.
HOUSE—House, Homer Doliver; contemp.
HUDS.—Hudson, William; 1730–1793.
HUTCHINS.—Hutchinson, J.; contemp.

JACKS., A. B.—Jackson, Albert Bruce; contemp.
JACQ.—Jacquin, Nicolaus Joseph; 1727–1817.
JACQUES—Jacques, Antoine A.
JAEG.—Jaeger, Hermann; 1815–1890.
JAMES—James, Edwin; 1797–1861.
JANCZ.—Janczewski von Glinka, Edward; 1846–1920.
JAUB.—Jaubert, Hippolyte François de; 1798–1874.
JAUME ST.-HIL.—Jaume Saint-Hilaire, Jean Henri; 1772–1845.
JOHNST.—Johnston, Ivan M.; contemp.
JUSS.—Jussieu, Antoine Laurent de, nephew of B. de Jussieu; 1748–1836.
JUSS., A.—Jussieu, Adrien de, son of A. L. de Jussieu; 1797–1843.
JUSS., B.—Jussieu, Bernard de; 1699–1777.

KAL.—Kaleniczenko, J.; wrote about 1850.
KALM—Kalm, Pehr; 1717–1779.
KARST.—Karsten, Gustav Karl Wilhelm Hermann; 1817–1908.
KEARN.—Kearney, Thomas Henry; contemp.
KER.—Ker, John Bellenden, or more correctly John Ker Bellenden, before 1804 John Gawler; 1765–1842.
KERN.—Kerner, von Marilaun, Anton Josef; 1831–1898.
KERN., J.—Kerner, Josef; wrote about 1860–1874.
KIRCHN.—Kirchner, Georg; 1837–1885.
KIT.—Kitaibel, Paul; 1757–1817.
KLOTZSCH.—Klotzsch, Johann Friedrich; 1805–1860.
KOCH—Koch, Wilhelm Daniel Joseph; 1771–1849.
KOCH, K.—Koch, Karl Heinrich Emil; 1809–1879.
KOEHNE—Koehne, Emil; 1848–1918.
KOERN.—Koernicke, Friedrich; 1828–1908.
KOMAR.—Komarov, Vlademir Leontyevitch; contemp.
KORSH.—Korshinsky, Sergyei Ivanovitch; 1861–1900.
KOST.—Kosteletzky, Vincenz Franz; 1801–1887.
KOTSCHY—Kotschy, Theodor; 1813–1866.
KRASSN.—Krassnov, Andrei Nikolayevitch; 1862–1915.
KTZE.—Kuntze, Carl Ernst Otto; 1843–1907.
KUNTH—Kunth, Carl Sigismund; 1788–1850.
KUNZE—Kunze, Gustav; 1793–1851.
KUSNETZ.—Kusnetzov, Nikolai Ivanovitch; contemp.

L.—Linné, Carl von (Linnaeus); 1707–1778.
L., F.—Linné, Carl von, the son; 1741–1783.
LABILL.—Labillardière, Jacques Julien Houtton de; 1755–1834.
LAG.—Lagasca y Segura, Mariano; 1776–1839.
LAM.—Lamarck, Jean Baptiste Antoine Pierre Monnet; 1744–1829.
LAMB.—Lambert, Aylmer Bourke; 1761–1842.
LANGE—Lange, Johan Martin Christian; 1818–1898.
LAUCHE—Lauche, Wilhelm; 1827–1882.
LAUTH—Lauth, Thomas; 1758–1826.
LAV.—Lavallee, Alphonse; 1835–1884.
LAWSON—Lawson & son; Peter L. (17..–1820); Charles L. (1794–1873).
LEDEB.—Ledebour, Carl Friedrich von; 1785–1851.
LEHM.—Lehmann, Johann Georg Christian; 1792–1860.
LEM.—Lemaire, Charles; 1800–1871.
LEMOINE—Lemoine (nurserymen); Victor L.; 1823–1911.
LEMM.—Lemmon, John Gill; 1832–1908.
LÉV. & VAN.—Léveillé, A. A. H.; Vaniot.
LÉVEILLÉ—Léveillé, Auguste Abel Hector; 1863–1918.
L'HÉR.—L'Héritier de Brutelle, Charles Louis; 1746–1800.
LINDL.—Lindley, John; 1799–1865.
LINGELSH.—Lingelsheim, Alexander; contemp.
LINK—Link, Heinrich Friedrich; 1767–1851.
LIPSKY—Lipsky, Vladimir Ippolivitch; contemp.
LITVIN.—Litvinov, Dmitri Ivanovitch; contemp.
LODD.—Loddiges (nurserymen); Conrad L., 1738–1826; George L., the son; 1784–1846.
LOES.—Loesener, Theodor; contemp.
LOISEL.—Loiseleur-Deslongchamps, Jean Louis Auguste; 1774–1849.
LOUD.—Loudon, John Claudius; 1783–1843.
LOUR.—Loureiro, Juan; 1715–1796.

MAACK—Maack, Richard; 1825–1886.
MACBR.—Macbride, J. Francis; contemp.
MACBR. & NELS.—Macbride, J. F.; Nelson, A.
MACK. & BUSH—Mackensen Bernard; 18..–1914; Bush, B. F.
MACM.—MacMillan, Conway; contemp.
MAK.—Makino, Tomitaro; contemp.
MAK. & SHIB.—Makino, T.; Shibata, Keita; contemp.
MANSF.—Mansfeld, Rudolph; contemp.
MARSH.—Marshall, Humphrey; 1722–1801.
MAST.—Masters, Maxwell Tylden; 1833–1907.
MATSUM.—Matsumura, Jinzo; contemp.
MATTF.—Mattfeld, Joh.; contemp.
MAXIM.—Maximowicz, Carl Johann; 1827–1891.
MAYR—Mayr, Heinrich; 1856–1911.
MED.—Medicus, Friedrich Casimir; 1736–1808.
MEDWED.—Medwedew (Medvyedev), Yakov Sergyeevitch; 1847–1923.
MEEH.—Meehan, Thomas; 1826–1901.
MEISN.—Meisner, Carl Friedrich; 1800–1874.
MERR.—Merrill, Elmer Drew; contemp.
MEY.—Meyer, Ernst Heinrich Friedrich; 1791–1858.
MEY., C. A.—Meyer, Carl Anton; 1795–1855.

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MEY., G. F. W.—Meyer, Georg Friedrich Wilhelm; 1782–1856.
MEZ—Mez, Karl; contemp.
MICHX.—Michaux, André; 1746–1802.
MICHX., F.—Michaux, François André, the son; 1770–1855.
MILL.—Miller, Philip; 1691–1771.
MIQ.—Miquel, Friedrich Anton Wilhelm; 1811–1871.
MITF.—Freeman-Mitford, Algernon Bertram, Lord Redesdale; 1837–1916.
MOENCH—Moench, Konrad; 1744–1805.
MORIC.—Moricand, Moise Etienne; 1779–1854.
MOORE, T.—Moore, Thomas; 1821–1887.
MORR.—Mooren, Charles Jacques Edouard; 1833–1886.
MOTT.—Mottet, Seraphin; contemp.
MOUILLEF.—Mouillefert, Pierre; 1845–1903.
MUELL., ARG.—Mueller, Jean (Argoviensis, i.e., of Aargau); 1828–1896.
MUELL., F. v.—Mueller, Ferdinand von; 1825–1896.
MUENCHH.—Muenchhausen, Otto von; 1716–1774.
MUHL.—Muhlenberg, Henry Ludwig; 1756–1817.
MUNRO—Munro, William; 1816–1880.
MUNSON—Munson, Thomas Volney; 1823–1913.
MURR.—Murray, Johann Andreas; 1740–1791.
MURR., A.—Murray, Andrew; 1812–1878.

NAKAI—Nakai, Takenoshi; contemp.
NASH—Nash, George Valentine; 1864–1919.
NAUD.—Naudin, Charles; 1815–1899.
NEES—Nees von Esenbeck, Christian Gottfried; 1776–1858.
NEILR.—Neilreich, August; 1803–1871.
NELS., A.—Nelson, Aven; contemp.
NELS., E.—Nelson, Elias Emanuel; contemp.
NICHOLS.—Nicholson, George; 1847–1908.
NIEDENZ.—Niedenzu, Franz; contemp.
NIEUWL.—Nieuwland, Julius Aloysius; contemp.
NORTON—Norton, John Bitting Smith; contemp.
NUTT.—Nuttall, Thomas; 1786–1859.
NYM.—Nyman, Carl Fredrik; 1820–1893.

OERST.—Oersted, Anders Sande; 1816–1872.
OLIV.—Oliver, Daniel; 1830–1917.
OLIVIER—Olivier, Guillaume Antoine; 1756–1814.
OPIZ—Opiz, Philipp Maximilian; 1787–1858.
ORPH.—Orphanides, Theodoros Georgios; 1817–1886.
OSBORN—Osborn, Arthur; contemp.
OTTO—Otto, Friedrich; 1782–1856.

PALL.—Pallas, Peter Simon; 1741–1811.
PAMPAN.—Pampanini, Renato; contemp.
PARL.—Parlatore, Filippo; 1816–1877.
PARRY—Parry, Charles Christopher; 1823–1890.
PARSONS—Parsons, Samuel B.; 1819–1906.
PAX—Pax, Ferdinand; contemp.
PAXT.—Paxton, Joseph; 1802–1865.
PENH.—Penhallow, David Pearce; 1854–1910.
PERS.—Persoon, Christian Hendrik; 1755–1837.
PETERM.—Petermann, Wilhelm Ludwig; 1806–1855.
PHIL.—Philippi, Rudolph Amandus; 1808–1904.
PILGER—Pilger, Robert; contemp.
PIPER—Piper, Charles Vancouver; 1867–1926.
PLANCH.—Planchon, Jules Emile; 1833–1900.
POECH—Poech, Joseph; 1816–1846.
POHL—Pohl, Johann Baptist Emanuel; 1782–1834.
POIR.—Poiret, Jean Louis Marie, 1755–1834.
POLL.—Pollich, Johann Adam; 1740–1780.
POURR.—Pourret, Pierre Andre; 1754–1818.
PRAIN—Prain, David; contemp.
PRESL—Presl, Karel Boriweg; 1794–1852.
PRITZ.—Pritzel, Georg August; contemp.
PURSH—Pursh, Frederick (Pursch, Friedrich Traugott); 1774–1820.

RAF.—Rafinesque-Schmaltz, Constantino Samuel; 1784–1842.
RAMOND—Ramond de Carbonnières, Louis François Elisabeth; 1753–1827.
RAOUL—Raoul, Edouard F. A.; wrote about 1846.
REG.—Regel, Eduard August von; 1815–1892.
REG. & SCHMALH.—Regel, E. A.; Schmalhausen, Johannes Theodor; 1849–1894.
REG. & TILING—Regel, E. A.; Tiling, Heinrich Sylvester Theodor; 18. .–1871.
REHD.—Rehder, Alfred; contemp.
REICHB.—Reichenbach, Heinrich Gottlieb Ludwig; 1793–1879.
REICHB., F.—Reichenbach, Heinrich Gustav, the son; 1823–1889.
REQ.—Requien, Esprit; 1788–1851.
RETZ.—Retzius, Andres Johan; 1742–1821.
RIV.—Rivière, Auguste & Charles; Marie August R.; 1821–1877; Charles Marie R.; 1845– .
ROB.—Robinson, Benjamin Lincoln; contemp.
ROD.—Rodigas, Emile; 183.–1902.
ROEM.—Roemer, Johann Jacob; 1763–1819.
ROEM., M. J.—Roemer, M. J.
ROLFE—Rolfe, Robert Allen; 1855–1921.
ROSE—Rose, Joseph Nelson; contemp.
ROMAN.—Romanet du Caillaud; wrote about 1881–1888.
ROTH—Roth, Albrecht Wilhelm; 1757–1834.
ROTHR.—Rothrock, Joseph Trimble; 1839–1922.
ROUY—Rouy, Georges; contemp.
ROUY & FOUC.—Rouy, G.; Foucaud, Julien; 18. .–1904.
ROXB.—Roxburgh, William; 1759–1815.
ROYLE—Royle, John Forbes; 1800–1858.
RUEMPL.—Ruempler, Theodor; 1817–1891.
RUIZ & PAV.—Ruiz, Lopez Hippolito; 1764–1815; Pavon, José, 175.–1844.
RUPR.—Ruprecht, Franz Josef; 1814–1870.
RUSBY—Rusby, Henry Hurd; contemp.
RYDB.—Rydberg, Per Axel; contemp.

SALISB.—Salisbury, Richard Anthony; 1761–1829.
SALM-DYCK—Salm-Reifferscheidt-Dyck, Joseph, Prince; 1773–1861.
SALZM.—Salzmann, Philipp; wrote about 1818.
SARG.—Sargent, Charles Sprague; contemp.
SARG., H. W.—Sargent, Henry Winthrop; 1810–1882.
SAV.—Savatier, Ludovic; 18. .–1891.
SAVI—Savi, Gaetano; 1769–1844.
SCHAU.—Schauer, Johan Konrad; 1813–1848.
SCHEELE—Scheele, Georg Heinrich Adolph; 1808–1864.
SCHELLE—Schelle, E.; contemp.
SCHK.—Schkuhr, Christian; 1741–1811.
SCHLECHT.—Schlechtendal, Diedrich Franz Leonhard von; 1794–1866.
SCHLEICH.—Schleicher, Johann Christoph; 1768–1834.

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SCHLEID.—Schleiden, Matthias Jacob; 1804–1881.
SCHMIDT—Schmidt, Franz; 1751–1834.
SCHMIDT, FR.—Schmidt, Friedrich; 1832–1908.
SCHNEID.—Schneider, Camillo Karl; contemp.
SCHOTT—Schott, Heinrich Wilhelm; 1794–1865.
SCHRAD.—Schrader, Heinrich Adolph; 1767–1836.
SCHRENK—Schrenk, Alexander Gustav; 1815–1876.
SCHULT.—Schultes, Joseph August; 1773–1831.
SCHULTZ BIP.—Schultz, Karl Heinrich (Bipontinus, i.e., of Zweibrücken); 1805–1867.
SCHUM.—Schumacher, Heinrich Christian Friedrich; 1757–1830.
SCHUM.—K., Schumann, Karl Moritz; 1851–1904.
SCHUR—Schur, Philipp Johann Ferdinand; 1799–1878.
SCHWEIN.—Schweinitz, Lewis David de; 1780–1834.
SCHWER.—Schwerin, Graf Fritz von; contemp.
SCOP.—Scopoli, Johann Anton; 1723–1788.
SEEM.—Seemann, Berthold Carl; 1825–1871.
SEEMEN—Seemen, Otto von; 1838–1910.
SER.—Seringe, Nicolas Charles; 1776–1858.
SHIRAS.—Shirasawá, Homi; contemp.
SIBTH.—Sibthorp, John; 1758–1796.
SIEB.—Siebold, Philipp Franz von; 1796–1866.
SIMON-LOUIS — Simon-Louis; nurserymen; contemp.
SIMS—Sims, John; 1792–1838.
SIMONKAI—Simonkai, Lajos tol (formerly Simkovics); 18. .–1910.
SKAN—Skan, Sydney Alfred; contemp.
SKEELS—Skeels, Homer C., contemp.
SM.—Smith, James Edward; 1759–1828.
SM., J.—Smith, John; 1798–1888.
SM., W. W.—Smith, William Wright; contemp.
SMALL—Small, John Kunkel; contemp.
SOLAND.—Solander, Daniel; 1736–1782.
SOMM.—Sommier, Stefano; 1848–1922.
SOUL.—Soulange-Bodin, Étienne; wrote about 1827–1842.
SOY.-WILLEM.—Soyer-Willemet, Hubert Félix; 1791–1861.
SPACH—Spach, Edouard; 1801–1879.
SPAETH—Spaeth; nurserymen; Franz Ludwig Spaeth; 1839–1913.
SPRAGUE—Sprague, Thomas Archibald; contemp.
SPRENG.—Sprengel, Kurt; 1766–1833.
SPRENGER—Sprenger, Karl; 1847–1918.
STANDL.—Standley, Paul Carpenter; contemp.
STAPF—Stapf, Otto; contemp.
STEUD.—Steudel, Ernst Gottlieb; 1783–1856.
STEV.—Steven, Christian von; 1781–1863.
ST.-HIL.—Saint-Hilaire, Auguste de; 1779–1853.
ST.-LAG.—Saint-Lager, Jean Baptiste; 1825–1912.
STOKES—Stokes, Jonathan; 1755–1831.
SUDW.—Sudworth, George Bishop; contemp.
SW.—Swartz, Olof; 1760–1818.
SWEET—Sweet, Robert; 1783–1835.
SZYSZ.—Szyszylowicz, Ignaz; 18. .–1910.

TAUB.—Taubert, Paul Hermann Wilhelm; 1862–1897.
TAUSCH—Tausch, Ignaz Friedrich; 1793–1848.
TEN.—Tenore, Michele; 1780–1861.
THOMAS—Thomas, Friedrich; 1840–1918.
THUNB.—Thunberg, Carl Peter; 1743–1822.
TIDEST.—Tidestrom, Ivar; contemp.
TORR.—Torrey, John; 1796–1873.
TORR. & GR.—Torrey, J.; Gray, A.
TOURN.—Tournefort, Joseph Pitton; 1656–1708.
TRATT.—Trattinick, Leopold; 1764–1849.
TRAUTV.—Trautvetter, Ernst Rudolph von; 1809–1889.
TREL.—Trelease, William; contemp.
TUCKERM.—Tuckerman, Edward; 1817–1886.
TURCZ.—Turczaninow, Nicolaus; 1796–1864.
VAHL—Vahl, Martin; 1749–1804.
VANH.—Houtte, Louis van; 1810–1876.
VAN TIEGH.—Van Tieghem, Philippe; 1839–1914.
VEITCH—Veitch, nurserymen; John Gould V.; 1839–67; Harry James V.; 1840–1924.
VENT.—Ventenat, Etienne Pierre; 1757–1808.
VERSCH.—Verschaffelt, Ambroise; 1825–1886.
VILL.—Villars, Dominique; 1745–1814.
VILM.—Vilmorin, Maurice Levêque de; 1849–1919.
VITM.—Vitman, Fulgenzio; 1728–1806.
VOSS—Voss, Andreas; 1857–1924.
WAHL.—Wahlenberg, Goran; 1780–1851.
WAHLB.—Wahlberg, Pehr Fredrick; 1800–1877.
WALDST.—Waldstein, Franz de Paula Adam, Graf von; 1759–1823.
WALL.—Wallich, Nathanie]; 1786–1854.
WALLR.—Wallroth, Carl Friedrich Wilhelm; 1792–1857.
WALP.—Walpers, Wilhelm Gerhard; 1816–1853.
WALT.—Walter, Thomas; 1740–1788.
WANGH.—Wangenheim, Friedrich Adam Julius von; 1747–1800.
WANGER.—Wangerin, Walter; contemp.
WARSCZ.—Warszewicz, Joseph; 1812–1866.
WATS., S.—Watson, Sereno; 1826–1892.
WENDER.—Wenderoth Georg Wilhelm Franz; 1774–1861.
WENDL.—Wendland, Heinrich Ludwig, son of J. C. Wendland; 1792–1869.
WENDL. — Wendland, Johann Christoph; 1755–1828.
WENDL., H.—Wendland, Hermann, grandson of J. C. Wendland; 1823–1903.
WENZ.—Wenzig, Theodor; 1824–1892.
WEST.—Weston, Richard; 1733–1806.
WETTST.—Wettstein, Richard von; contemp.
WIEG.—Wiegand, Karl McKay; contemp.
WIGHT—Wight, Robert; 1796–1872.
WIGHT & HEDR.—Wight, W. F.; Hedrick, Ulysses Prentiss; contemp.
WIGHT, W. F.—Wight, William Franklin; contemp.
WILLD.—Willdenow, Karl Ludwig; 1765–1812.
WILLK. & LGE.—Willkomm, Heinrich Moritz; 1821–1895; Lange, J. M. C.
WILLM.—Willmott, Ellen; contemp.
WILS.—Wilson, Ernst Henry; contemp.
WIMM.—Wimmer, Christian Friedrich Heinrich; 1803–1868.
WITH.—Withering, William; 1741–1799.
WITTM.—Wittmack, Max Carl Ludwig; 1839–1919.
WITTR.—Wittrock, Veit Brecher; 1839–1914.
WOLF, E.—Wolf, Egbert; contemp.
WOOD—Wood, Alphonso; 1810–1881.
WOOT.—Wooton, Elmer Otis; contemp.
WRIGHT, C. H.—Wright, Charles Henry; contemp.
WULF.—Wulfen, Franz Xaver von; 1728–1805.

ZAB.—Zabel, Hermann; 1832–1912.
ZEDERB - Zederbaur, Emerich; contemp.
ZENARI—Zenari, S.; contemp.
ZUCC.—Zuccarini, Joseph Gerhard; 1797–1848.

ABBREVIATIONS OF REFERENCES TO ILLUSTRATIONS

An arrow after the volume number and the date indicates that the publication is continued. *Il.* refers to illustrations in the text, and *pl.* signifies plate, *col. pl.* colored plate. F, Q, and O refer to the size of the publications, as Folio, Quarto or Octavo.

Ad.....Addisonia; Colored Illustrations and Popular Descriptions of Plants. Published by the New York Botanic Garden. Vol. I⟶ O. New York, 1916⟶ Col. pl.
A.C.....Antoine, Franz. Die Cupressineen-Gattungen. F. Wien, 1857. 92 pl.
A.F.....The American Florist. Vol. I⟶ Q. Chicago, 1885⟶ Il. and few pl.
A.G.....American Gardening. Vol. I⟶ Q. New York, 1880⟶ —Vol. I–XII, called "American Garden" (1880–91). Il.
A.I.....Abrams, L. An Illustrated Flora of the Pacific States. Vol. I. Q. Stanford University, Calif., 1923⟶ Il.
A.R.....Andrews, Henry. The Botanists' Repository. 10 vol. Q. London, 1797–1812. 664 col. pl.
B.....The Botanist. Ed. by B. Maund. 5 vol. O. London, 1837–46. 250 col. pl.
B.B.....Britton, N. L., and Brown, Addison. An Illustrated Flora of the Northern United States, Canada, etc. 3 vol. Q. Ed. 2. New York, 1913. Il.
B.C.....Bailey, L. H. Standard Cyclopedia of Horticulture. 6 vol. O. New York, 1914–17. Il. and pl., some col.
B.D.....Bulletin de la Société Dendrologique de France. Vol. 1906⟶ O. Paris, 1906⟶ Il. and pl.
B.E.....Bailey, L. H. The Cultivated Evergreens. O. New York, 1923. Il. and pl.
B.F.....Bulletin de la Société Botanique de France. Vol. I⟶ O. Paris, 1854⟶ Il. and pl.
B.H.....La Belgique Horticole. 20 vol. O. Gand, 1851–70. Col. pl.
B.J.....Botanische Jahrbücher. Ed. by A. Engler. Vol. I⟶ O. Berlin, 1881⟶ Il. and pl.
B.M.....The Botanical Magazine. Ed. by Wm. Curtis and others. Vol. I.⟶ O. London, 1787⟶ Col. pl.
B.N.....Beissner, L. Handbuch der Nadelholzkunde. Ed. 2. O. Berlin, 1909. Il.
B.R.....The Botanical Register. Ed. by S. Edward (Vol. I–XIV) and J. Lindley (Vol. XV–XXXIII). O. London, 1815–47. Col. pl.
B.S.....Bean, W. J. Trees and Shrubs Hardy in the British Isles. 2 vol. O. London, 1914. Il. and pl.
B.T.....Britton, N. L. North American Trees. O. New York, 1908. Il.
C.B.....Clinton-Baker, Henry. Illustrations of Conifers. Q. Hertford (Eng.), 1909. 171 pl.
C.L.....Country Life in America. Vol. I⟶ Q. New York, 1901⟶ Il.
C.R.....Clements, F. E. and E. S. Rocky Mountain Flowers. O. White Plains, New York, 1914. 47 pl., partly colored, each with several figures.
C.S.....Camus, A. and E. G. Classification des Saules d'Europe. O and F (atlas). 2 vol. Paris, 1904–5. 60 pl.
D.H.....Dallimore, W. Holly, Yew and Box. O. London, 1908. Pl.
D.J.....Dallimore, W., and Jackson, A. B. A Handbook of Conifers. O. London, 1923. Il. and pl.
D.L.....Dippel, L. Handbuch der Laubholzkunde. 3 vol. O. Berlin, 1889–93. Il.
E.H.....Elwes, H. J., and Henry, A. The Trees of Great Britain and Ireland. 7 vol. Q. Edinburgh, 1906–13. 419 pl. (5 col.)
Em.....Emerson, G. B. A Report on the Trees and Shrubs Growing Naturally in the Forests of Massachusetts. Ed. 4. O. Boston, 1875. Pl. partly col.
E.N.....Engler, A., and Prantl, Karl. Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten. Teil I–IV, each in several parts; suppl. 1–4. O. Leipzig, 1887–1915. Il. and pl.
E.P.....Engler, A. Das Pflanzenreich; Regni Vegetabilis Conspectus. Part 1⟶ O. Leipzig, 1900⟶ Il.—Cited by the number of the family.
F.....The Florist.—Continued as: Florist, Fruitist and Garden Miscellany. 14 vol. O. London, 1848–61. Il. and col. pl.
F.C.....Floral Cabinet and Magazine of Exotic Botany. Ed. by Knowles & Westcott. 3 vol. O. London, 1837–40. Col. pl.
F.D.....Flora von Deutschland. Ed. by D. F. L. von Schlechtendal, Langethal und Schenk. Ed. 5 by Ernst Hallier. 30 vol. O. Gera-Untermhaus, 1880–87. 3470 col. pl.
F.E.....The Florists' Exchange. Vol. I⟶ F. New York, 1888⟶ Il. and few pl.
F.L.....Forest Leaves. Published for the Pennsylvania Forestry Association. Vol. I⟶ O. Philadelphia, 1886⟶ Il. and pl.
F.M.....The Floral Magazine. 20 vol. O and Q. London, 1861–81. 1022 col. pl.
F.P.....Florist and Pomologist. 22 vol. O. London, 1863–84. Il. and col. pl.
F.R.....Flora and Sylva. Ed. by W. Robinson. 3 vol. Q. London, 1903–5. Il. and col. pl.

ABBREVIATIONS OF REFERENCES

F.S.....Flore des Serres et des Jardins de l'Europe. 23 vol. O. Gand, 1845–80. Il. and col. pl.
F.Sa.....Forbes, James. Salicetum Woburnense. F. London, 1829. 140 col. pl.
F.W.....The Floral World and Garden Guide. Ed. by Shirley Hibberd. 23 vol. O. London, 1858–80. Il. and col. pl.
G.....Gardening Illustrated. Vol. I⟶ Q. London, 1880⟶ Il.
G.C.....The Gardeners' Chronicle. 1841–73.—Ser. II (new ser.), vol. I–XXVI.—Ser. III, vol. I⟶ F. London, 1841⟶ Il. and pl., some col.
Gd.W.....Goodale, G. L., Wild Flowers. O. Boston, 1882. Col. pl.
G.F.....Garden and Forest. Ed. by C. S. Sargent. 10 vol. Q. New York, 1888–97. Il.
Gg.....Gardening. Vol. I⟶ Q. Chicago, 1892⟶ Il.
Gg.W.....Gardening World Illustrated. Vol. I–XXVI. F and Q. London, 1884–1900. Il.
G.H.....Guimpel, F., Willdenow and Hayne. Abbildungen der Deutschen Holzarten. 2 vol. Q. Berlin, 1815–20. 216 col. pl.
G.M.....Gardeners' Magazine. Ed. by Shirley Hibberd and others. Vol. I⟶ O, Q, F. London, 1860⟶ Vol. I–VII called "Gardeners' Weekly Magazine and Floricultural Cabinet." Il. and col. pl.
G.M.B....Gardeners' Magazine of Botany, Horticulture, Floriculture and Natural Sciences. Ed. by Thomas Moore and W. P. Ayres. 3 vol. O. London, 1850–51. Il. and col. pl.
Gn.....The Garden. Founded by Wm. Robinson. Vol. I⟶ Q. London, 1871⟶ Il. and col. pl.
Gn.M.....The Garden Magazine. Vol. I⟶ Q. New York (Garden City, N. Y.), 1905⟶ Il.
G.O.....Guimpel, W., Otto and Hayne, Abbildungen der fremden in Deutschland ausdauernden Holzarten. Q. Berlin, 1825 [1819–30]. 144 col. pl.
Gr.G.....Gray, Asa. Genera of the Plants of the United States Illustrated. 2 vol. O. New York, 1849. 186 pl.
Gr.M.....Gray, Asa. A Manual of the Botany of the Northern United States. Ed. 7; ed. by B. L. Robinson and M. L. Fernald. O. New York, 1908. Il.
Gs.....Gartenschönheit. Ed. by K. Förster, C. Schneider and O. Kühl. Vol. I⟶ F. Berlin-Westend, 1920⟶ Il. and col. pl.
Gt.....Gartenflora. Ed. by Ed. Regel and others. Vol. I⟶ O. Erlangen, etc., 1852⟶ Il. and col. pl.
G.W.....Gartenwelt. Ed. by Max Hesdörffer and others. Vol. I⟶ Q. Berlin, 1897⟶ Il. and some col. plates.
G.Z.....Gartenzeitung; Monatschrift für Gärtner und Gartenfreunde. Ed. by L. Wittmack and W. Perring. 4 vol. O. Berlin, 1882–85. Il. and col. pl.
H.A.....Hayne, F. G. Getreue Darstellung und Beschreibung der in der Arzneykunde gebräuchlichen Gewächse. 14 vol. Q. Berlin, 1805–46. Col. pl.
H.B.....Horticulture. New ser.; vol. I⟶ Q. Boston, 1923⟶ Il.—The volumes of the first series, 1904–23 (37 vol.) are cited by the year.
H.C.....Hartig, Th. Vollständige Naturgeschichte der forstlichen Culturpflanzen Deutschlands. Q. Berlin, 1851. 118 col. pl.
H.D.....Hornibrook, Murray. Dwarf and Slow-growing Conifers. O. London, 1923. Pl.
H.E.....Hooker, W. J. Exotic Flora. 3 vol. O. Edinburgh, 1823–27. 232 col. pl.
H.F.....L'Horticulteur Français. Ed. by F. Herincq. 21 vol. O. Paris, 1851–72. Il. and col. pl.
H.G.....Hamburger Garten- und Blumenzeitung. 46 vol. O. Hamburg, 1845–90.—Vol. I–VII have the title "Neue Allgemeine Deutsche Garten- und Blumenzeitung." Il. and col. pl.
H.H.....Hough, R. B. Handbook of the Trees of the Northern States and Canada East of the Rocky Mountains. O. Lowville, N. Y., 1907. Il.
H.I.....Hooker's Icones Plantarum. Vol. I⟶ O. London, 1837⟶ Pl.
H.U.....L'Horticulteur Universel. Ed. by C. Lemaire. 8 vol. O. Paris, 1839–47. Col. pl.
H.W.....Hempel, G., and Wilhelm, K. Die Bäumen und Sträucher des Waldes. 3 parts in 2 vol. Q. Wien, 1889–99. Il. and col. pl.
I.G.....Illustrierte Gartenzeitung. Ed. by A. Courtin and C. Müller (1857–79), by M. Lebl (1880–95). Vol. I–XXXIX. O. Stuttgart, 1857–95. Il. and col. pl.
I.H.....L'Illustration Horticole. Ed. by C. Lemaire and others. 43 vol. Q. and F. Gand, 1854–96. Il. and col. pl.
I.T.....Icones Selectae Horti Thenensis. Ed. by L. van den Bossche. 6 vol. O. Bruxelles, 1899–1909. 240 pl.
J.....Le Jardin. Ed. by H. Martinet. Q. Vol. I–XXXV. F. Argenteuil and Paris, 1887–1921.—United with Revue Horticole in July, 1921. Il. and col. pl.
J.C.....Journal of the College of Science. Imp. University, Japan. Vol. I⟶ Q. Tokyo, 1887⟶ Il. and pl.
J.F.....Le Jardin Fleuriste. Ed. by C. Lemaire. 4 vol. O. Gand, 1851–54. Il. and col. pl.
J.H.....Journal of Horticulture. Vol.XXVI–LXIII. Q. London, 1861–80.—Ser. III, vol. I⟶ Sq. F. London, 1881⟶ Il.—Vol. I–XXV was issued under the title "Cottage Gardener" and is not cited.
J.L.....Journal of the Roy. Horticultural Society of London. 9 vol.—New ser. (II); vol. I⟶ O. London, 1846⟶ Il. and pl.
J.P.....Journal de la Société National d'Horticulture de France. 12 vol. (1855–66).—Ser. II (1867–78).—Ser. III; 21 vol. (1879–99).—Ser. IV, Vol. I.⟶ (1900⟶). O. Paris, 1855⟶ Il.
J.S.....Jepson, W. L. The Silva of California. Q. Berkeley, 1910. Il. and pl.
K.D.....Koehne, E. Deutsche Dendrologie. O. Stuttgart, 1893. Il.
K.S.....Keeler, H. L. Our Northern Shrubs. O. New York, 1903. Pl.

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K.V.....Kent, A. H. Veitch's Manual of the Coniferae. New ed. O. Chelsea, 1900. Il.
L.A.....Loudon, J. C. Arboretum et Fruticetum Britannicum. 8 vol. O. London, 1838. Il. and 418 pl.
L.B.....Loddiges, C. and Sons. The Botanical Cabinet. 20 vol. O. London, 1818–33. 2000 col. pl.
L.D.....Loiseleur-Deslongchamps, J. L. A. Herbier Général de l'Amateur. 8 vol. (1816–27).—Ser. II; 6 vol. (1839–50). Q. Paris, 1816–50. 1036 col. pl.
L.G.....Lounsberry, L. A Guide to the Wild Flowers. O. New York, 1900. Il. and col. pl.
L.H.....Lowe, E. J. and Howard, W. Beautiful Leaved Plants. New ed. Q. London, 1865. 60 col. pl.
L.I.....Lavallée, A. Arboretum Segrezianum; Icones Selectae Arborum et Fruticum. Q. Paris, 1880–85. 36 pl., also 28 unpublished pl. without numbers or names.
L.S.....Lounsberry, A. Southern Wild Flowers and Trees. O. New York, 1901. Il. and col. pl.
M.A.....Mouillefert, P. Traité des Arbres et Arbrisseaux. 2 parts and atlas. O. Paris, 1892–98. 195 pl., partly col.
M.Am....Millspaugh, C. F. American Medicinal Plants. 2 vol. Q. New York, 1887. 180 col. pl.
M.B.....Mitford, A. B. Freeman. The Bamboo Garden. O. London, 1896. Pl.
M.B.G....The Magazine of Botany and Gardening, British and Foreign. Ed. by J. Rennie. 2 vol.—Ser. II; 3 vol. Q. London, 1836–37. Col. pl.
M.D.....Mitteilungen der Deutschen Dendrologischen Gesellschaft. No. 1⟶ O. Berlin, 1893⟶ Il. and pl., few col.
M.G.....Möller's Deutsche Gärtner-Zeitung. Vol. I⟶ F. Erfurt, 1886⟶ Il.
M.I.....Matsumura, J. Icones plantarum koisbikavenses. Vol. I⟶ O. Tokyo, 1911⟶ Pl.
M.M.....Meehan's Monthly. Ed. by Th. Meehan. 12 vol. Q. Germantown, Pa., 1891–1902. Il. and col. pl.
M.N.....Meehan, Th. The Native Flowers and Ferns of the United States. 2 vol. Q. Boston, 1878–9. 96 col. pl.
M.O.....Mottet, S. Arbres et Arbustes d'Ornement de Pleine Terre. O. Paris, 1925. Il. and pl.
M.S.....Michaux, F. A. The North American Sylva. 3 vol. Q. Philadelphia, 1865. 156 col. pl.
N.D.....Nouveau Duhamel; *this is:* Duhamel du Monceau, H. L. Traité des Arbres et Arbustes. New ed. 7 vol. F. Paris, 1804–19. 487 col. pl.
N.I.....Nicholson, G. The Illustrated Dictionary of Gardening. 4 vol. and suppl. Q. London and New York, 1887–1900. Il.
N.K.....Nakai, T. Flora Sylvatica Koreana. Vol. I-XIV⟶ O. Tokyo, 1915⟶ Pl.
N.S.....Nuttall, The North American Sylva. New ed. 3 vol. (vol. IV–VI of Michaux and Nuttall's North American Sylva). Q. Philadelphia, 1865. 121 col. pl.
N.T.....Nakai, T. Trees and Shrubs of Japan Proper. Vol. I. O. Tokyo, 1922. Il.
P.B.....Perrin, Mrs. I. S. British Flowering Plants. 3 vol. Q. London, 1914. 223 col. pl.
P.F.....Paxton's Flower Garden. By J. Lindley and J. Paxton. 3 vol. Q. London, 1850–53. Il. and 72 col. pl.
P.G.....Popular Gardening (and Fruit Growing). 6 vol. F. Buffalo, 1885–91. Il.
P.M.....Paxton's Magazine of Botany. 16 vol. O. London, 1834–49. Il. and Col. pl.
R.B.....Revue de l'Horticulture Belge et Etrangère. Vol I⟶ Q. Gand, 1875⟶ Il. and col. pl.
R.H.....Revue Horticole. Vol. 1829⟶ O. Paris, 1829⟶ Il. and col. pl.
R.I.....Reichenbach, H. G. L. Icones Florae Germanicae et Helveticae. 25 vol. Q. Leipzig, 1834⟶ Col. pl.
R.Mo....Annual Report of the Missouri Botanical Garden. Vol. I⟶ O. St. Louis, 1889⟶ Pl.
R.R.....Redouté, P. J. Les Roses. Text by C. A. Thory. 3 vol. Ed. 3. 3 vol. O. Paris, 1835.—As neither pages nor plates are numbered, the plates are cited by the numbered groups "gr." followed by the number of the plate within the group according to sequence. The first folio edition (1817–24) is very rare and is not cited. 183 col. pl.
S.B.....Sweet, R. The British Flower Garden. 3 vol. and ser. II, 4 vol. O. London, 1823–38. 300 col. pl.
S.C.....Sweet, R. Cistineae. Q. London, 1825–30. 112 col. pl.
S.E.....Sowerby, J. English Botany or Colored Figures of British Plants. Ed. 3. Ed. by J. T. B. Syme. 13 vol. O. London, 1863–1902. 1952 col. pl.
S.F.....Sibthorp, J. Flora graeca. 10 vol. F. London, 1806–40. 966 col. pl.
S.H.....Schneider, C. Illustriertes Handbuch der Laubholzkunde. 2 vol. and Index. O. Jena, 1906–12. Il.
S.I.....Shirasawa, H. Iconographie des Essences Forestières du Japon. 2 vol. F. Paris, Tokyo, 1899–1909. 162 col. pl.
S.L.....Silva Tarouca, E., and Schneider, C. Unsere Freiland-Laubgehölze. Ed. 2. Q. Wien and Leipzig, 1922. Il. and 16 col. pl.
S.M.....Sargent, C. S. Manual of the Trees of North America. Ed. 2. O. Boston and New York, 1922. Il.
S.N.....Silva Tarouca, E., and Schneider, C. Unsere Freiland-Nadelhölzer. Ed. 2. Q. Wien & Leipzig, 1923. Il. and 12 pl. and 12 col. pl.
S.O.....Schmidt, Franz. Oesterreichs Allgemeine Baumzucht. 4 vol. F. Wien, 1792–1822. 240 col. pl.
S.S.....Sargent, C. S. The Silva of North America. 14 vol. Q. Boston, etc., 1891–1902. 740 pl.

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S.St.....Silva Tarouca, E., and Schneider, C. Unsere Freiland-Stauden. Ed. 2. O. Wien and Leipzig, 1922. Il. and 12 col. pl.
S.T.....Sargent, C. S., ed. Trees and Shrubs. 2 vol. F. Boston, etc., 1905-13. 200 pl.
S.Z.....Siebold, P. F., and Zuccarini, J. G. Flora Japonica. 2 vol. Q. Leyden, 1835–70. 151 col. pl.
T.M.....Tokyo Botanical Magazine. Vol. I⟶ O. Tokyo, 1887⟶ Pl.
T.N.....Torrey, J. A Flora of the State of New York. 2 vol. Q. New York, 1843. Col. pl.
U.S.Im....United States.—Bureau of Plant Industry; Bulletin of Foreign Plant Introduction. Nos. 1–100 (1908–14).—Plant immigrants. No. 101⟶ Q. Washington, 1914⟶ Pl.
U. S. Inv..United States—Bureau of plant industry; Inventory of seeds and plants imported. No. 1⟶ O. Washington, 1899⟶ Pl.
V.F.....Vilmorin, M. L. de, and Bois, D. Fruticetum Vilmorinianum. O. Paris, 1904. Pl,
W.A.....Wilson, E. H. America's Greatest Garden; the Arnold Arboretum. O. Boston. 1925. 50 pl.
W.C.....Wilson, E. H. The Conifers and Taxads of Japan. Q. Cambridge, 1916. 59 pl.
W.D.....Watson, P. W. Dendrologia Britannica. 2 vol. O. London, 1825. 172 col. pl.
W.G.....Wiener Illustrierte Garten-Zeitung. Vol. I⟶ O. Wien, 1876⟶ Vol. I–III issued under the title "Wiener Obst- und Garten-Zeitung." Il. and col. pl.
W.J.....Wilson, E. H. The Cherries of Japan. O. Cambridge, 1816. 8 pl.
W.R.....Willmott, Ellen. The Genus Rosa. 2 vol. F. London, 1910–1914. Pl. and col. pl.

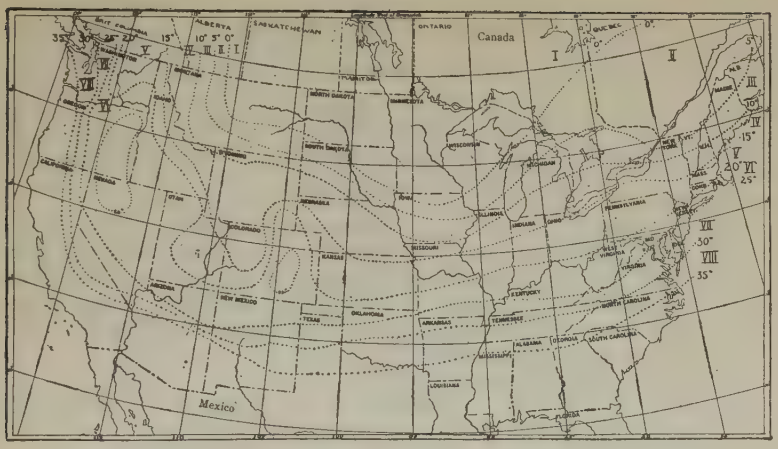
OTHER ABBREVIATIONS USED IN CONNECTION WITH THE ABBREVIATIONS CITED ABOVE

(*b*).....bark
(*c*).....colored plate or illustration
f.....figure
(*h*).....habit figure
(*hc*).....habit figure colored
(*l*).....leaf
t.....plate (Latin tabula)

FURTHER ABBREVIATIONS AND EXPLANATION OF SIGNS

Afghan., Afghanistan
Afr., Africa
Ala., Alabama
Alb., Alberta
Am., America or American
Ark., Arkansas
Assina., Assiniboia
Austr., Australia
Auth., Authors
B. C., British Columbia
br., *brs.*, branch, branches
brt., *brts.*, branchlet, branchlets
C., central
Calif., California
caps., capsule
Cauc., Caucasus
cm., centimeter, centimeters
Colo., Colorado
Conn., Connecticut
cult., cultivated, cultivation
Del., Delaware
diam., diameter
e., east or eastern
Eng., England
Eu., Europe
f., forma (in connection with a botanical name), or figure (in a citation of an illustration)
fl., flower
Fla., Florida
-fld., -flowered, as few-fld
fls., flowers
fr., *frs.*, fruit, fruits
Himal., Himalayas
Huds. B., Hudson Bay
Ill., Illinois
Ind., Indiana
intr., introduced
isl., *isls.*, island, islands or isles
Kamtch., Kamtchatka
Kans., Kansas
Ky., Kentucky
l., lusus, a slight variation (in connection with botanical names)
Lab., Labrador
l. c., loco citato, at the place or in the work cited (in connection with the citation of an illustration)
lf., leaf
lft., *lfts.*, leaflet, leaflets
-lvd., -leaved, as 3-lvd
lvs., leaves
m., meter, meters
Mal., Malaysia, Malayan
Man., Manitoba
Manch., Manchuria
Mass., Massachusetts
Md., Maryland
Me., Maine
Mediterr., Mediterranean
Mich., Michigan
Minn., Minnesota
mm., millimeter, millimeters
mt., *mts.*, mountain, mountains
n., north, northern
N. B., New Brunswick
N. C., North Carolina
N. D., North Dakota
n. e., northeast, northeastern
Neb., Nebraska
Nev., Nevada
Nfld., Newfoundland
N. J., New Jersey
N. H., New Hampshire
N. Mex., New Mexico
No., number
N. S., Nova Scotia
n. w., northwest, northwestern
N. Y., New York
Okla., Oklahoma
Ont., Ontario
Ore., Oregon
Orig., origin, originated
Pa., Pennsylvania
Que., Quebec, province of
R. I., Rhode Island
s., south, southern
Sask., Saskatchewan
S. C., South Carolina
Scand., Scandinavia
S. D., South Dakota
s. e., southeast, southeastern
sect., section
ssp., subspecies
subgen., subgenus
subtrop., subtropical
s. w., southwest, southwestern
t., plate (tabula), in citations of illustrations
temp., temperate
Tenn., Tennessee
trop., tropical
Turkest., Turkestan
var., *vars.*, variety, varieties
Vt., Vermont
w., west, western
W. Va., West Virginia
Wisc., Wisconsin
Wyo., Wyoming
– figures connected by a dash indicate the extreme of variation, as 4–10 cm., from 4 to 10 cm.

? indicates doubt
§ section.
× sign of a hybrid, or "*crossed with*" if between two names
+ sign of a graft-hybrid
I-XII, Roman numerals (small capitals) after fl. (flowering time) and fr. (fruiting time) denote the months according to their sequence
I–VIII, Roman numerals (capitals) refer to the eight climatic zones. See map on opposite page



CLIMATIC ZONES, I–VIII

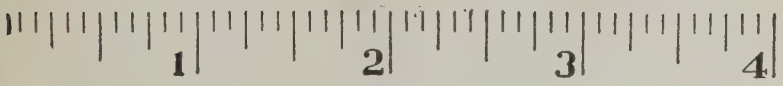
To indicate approximately the hardiness of trees and shrubs. See p. xiv.

APPROXIMATE EQUIVALENTS OF THE METRIC AND ENGLISH SYSTEMS OF MEASUREMENTS.

1 millimeter (mm.)	=1/25 of an inch	5 centimeters	=2 inches
2 millimeters	=1/12 of an inch	10 centimeters (or 1 decimeter)	=4 inches
1 centimeter (cm.)	=2/5 of an inch	30 centimeters	=1 foot
2.5 centimeters	=1 inch		

1 meter (m.)=3 1/3 feet or 40 inches

CENTIMETERS



INCHES

SYNOPSIS
OF THE ORDERS AND FAMILIES CONTAINED IN THIS BOOK

All the families treated in this book belong to the Division SPERMATOPHYTA or SEED-PLANTS (*Phanerogamae, Phaenogamae, Embryophyta siphonogama*) differing from the other Divisions of the VEGETABLE COMMUNITY chiefly in the presence of true flowers containing stamens or pistils or both and in the reproduction by seeds containing an embryo.

Subdivision I. GYMNOSPERMAE. GYMNOSPERMS. Ovules naked, not inclosed in an ovary; fls. unisexual, rarely bisexual.

A. Lvs. fan-shaped, deciduous: fertilization by motile sperm-cells...Class I. GINKGOALES
Fam. 1. *Ginkgoaceae*, 1

AA. Lvs. scale-like or linear to oblong or elliptic, persistent, rarely deciduous: fertilization by passive sperm-cells.

B. Fls. without perianth.....Class II. CONIFERALES

C. Ovules solitary or few, developing into a drupe-like or berry-like seed.
Fam. 2. *Taxaceae*, 1

CC. Ovules borne on scales forming a cone which becomes woody, rarely berry-like at maturity; seeds often winged.....Fam. 3. *Pinaceae*, 7

BB. Fls. with a 2–4-parted perianth, rarely bisexual; pistillate fls. with 1 naked ovule.
Class III. GNETALES
Fam. 4. *Gnetaceae*, 66

Subdivision II. ANGIOSPERMAE. ANGIOSPERMS. Ovules inclosed in an ovary; fls. usually with perianth, unisexual or bisexual.

Class I. MONOCOTYLEDONEAE. MONOCOTYLEDONS. Embryo with one cotyledon: lvs. mostly parallel-veined: fls. usually 3- or 6-merous, not 5-merous: stem without annual layers, without clear distinction of bark, wood and pith.

A. Fls. without perianth or the perianth reduced to 1–3 minute scales: lvs. usually linear.
Order I. GLUMIFLORAE
Fam. 5. *Gramineae*, 68

AA. Fls. with perianth.

B. Fr. a 1-seeded drupe or berry; infl. a simple or branched spadix: stem usually unbranched, with large stiff fan-shaped or pinnate lvs. at apex.....Order II. PRINCIPES
Fam. 6. *Palmae*, 75

BB. Fr. a caps. or berry, 3- to many-seeded: infl. not a spadix.....Order III. LILIIFLORAE
Fam. 7. *Liliaceae*, 76

Class II. DICOTYLEDONEAE. DICOTYLEDONS. Embryo normally with 2 opposite cotyledons: lvs. usually net-veined: parts of fls. mostly in whorls of 4 or 5: stem with clear distinction of bark, wood and pith; the wood forming annual layers.

Subclass I. CHORIPETALAE (*Apetalae* and *Polypetalae*.) Petals distinct or wanting or only some of the petals united at base.

A. Petals wanting (except in Fam. 23): lvs. simple (except in Fam. 12).

B. Sepals in one whorl or wanting: fls. unisexual, at least the staminate in catkins (except in some genera of Fam. 14).

C. Ovary superior or naked: fls. dioecious (sometimes monoecious in Fam. 10).

D. Fr. a many-seeded dehiscent caps: fls. without perianth, dioecious.
Order I. SALICALES
Fam. 8. *Salicaceae*, 82

DD. Fr. a nut, drupe or berry, 1-, rarely 2-seeded.

E. Ovary with 2 ovules; staminate fls. with 4 sepals: lvs. opposite.
Order II. GARRYALES
Fam. 9. *Garryaceae*, 122

EE. Ovary with 1 ovule; staminate fls. without perianth: lvs. alternate.

F. Style with 2 stigmas: ovules orthotropous.....Order III. MYRICALES
Fam. 10. *Myricaceae*, 123

FF. Style not cleft, stigmatic at apex; ovule amphitropous.
Order IV. LEITNERIALES
Fam. 11. *Leitneriaceae*, 124

CC. Ovary inferior or partly so; staminate fls. with perianth; fls. monoecious.
D. Ovary with 1 basal orthotropous ovule: lvs. pinnate.....Order V. JUGLANDALES
Fam. 12. *Juglandaceae*, 125
DD. Ovary with 2 or 6 pendulous ovules, but fr. usually 1-seeded: lvs. simple.
Order VI. FAGALES
E. Fr. a nut or nutlet partly or wholly enclosed in a more or less leafy involucre, or nutlets disposed in a strobile or ament.....Fam. 13. *Betulaceae*, 133
EE. Fr. a nut partly or wholly enclosed in a woody, often spiny involucre.
Fam. 14. *Fagaceae*, 155
BB. Perianth usually of 2 whorls; fls. usually not in catkins.
C. Fls. unisexual, rarely bisexual (sometimes so in Fam. 15 and 20).
D. Fr. not a caps.: ovary 1-celled.
E. Ovary superior.....Order VII. URTICALES
F. Ovule pendulous: lvs. alternate.
G. Fls. solitary or in axillary clusters or racemes: sap not milky.
Fam. 15. *Ulmaceae*, 183
GG. Fls. in cymes, spikes or heads: sap milky.....Fam. 16. *Moraceae*, 196
FF. Ovule erect or ascending: lvs. opposite.....Fam. 17. *Urticaceae*, 201
EE. Ovary inferior or half-inferior: lvs. often opposite.....Order VIII. SANTALALES
F. Fr. a drupe or nut: parasitic on roots.....Fam. 18. *Santalaceae*, 201
FF. Fr. a berry: parasitic on brs. of trees.....Fam. 19. *Loranthaceae*, 202
DD. Fr. a caps.: ovary several-celled: perianth large, corolla-like.
Order IX. ARISTOLOCHIALES
Fam. 20. *Aristolochiaceae*, 204
CC. Fls. usually bisexual: ovary superior, 1-celled.
D. Embryo straight or nearly so: fr. an achene: lvs. alternate; stipules usually sheathing.....Order X. POLYGONALES
Fam. 21. *Polygonaceae*, 205
DD. Embryo coiled, rarely straight.....Order XI. CENTROSPERMAE
E. Lvs. alternate: fls. without scarious bracts; petals wanting: fr. an utricle.
Fam. 22. *Chenopodiaceae*, 203
EE. Lvs. opposite: fls. with scarious bracts; petals often present: fr. a caps., rarely an utricle.....Fam. 23. *Caryophyllaceae*, 212
AA. Petals present or sepals petaloid, rarely fls. apetalous or naked.
B. Ovary superior (or sometimes half-inferior or wholly inferior in Fam. 36, 37 and 40).
C. Parts of fls. often spirally arranged, sometimes wanting; stamens usually many; carpels 1 to many, usually distinct.....Order XII. RANALES
D. Perianth wanting.
E. Fls. with 5 to many carpels: lvs. alternate, exstipulate
Fam. 24. *Trochodendraceae*, 212
EE. Fls. with 1 carpel: lvs. opposite, stipulate.....Fam. 25. *Cercidiphyllaceae*, 213
DD. Perianth present.
E. Plants without oil-cells, not aromatic.
F. Fr. an achene, follicle or berry.
G. Anthers not opening by valves; carpels several to many.
H. Petals present or sepals petaloid: fls. usually bisexual.
Fam. 26. *Ranunculaceae*, 214
HH. Petals wanting: fr. berry-like, usually dehiscent, many-seeded; fls. usually unisexual.....Fam. 27. *Lardizabalaceae*, 229
GG. Anthers opening by valves; carpels usually solitary: fr. a berry.
Fam. 28. *Berberidaceae*, 232
FF. Fr. a drupe: fls. usually dioecious; petals usually small.
Fam. 29. *Menispermaceae*, 250
EE. Plants with oil-cells, aromatic.
F. Stamens numerous, spirally arranged, opening by pores or slits.
G. Seeds without or with solid albumen; pistils many.
H. Pistils usually on an elongated axis, rarely whorled: lvs. alternate.
Fam. 30. *Magnoliaceae*, 252
HH. Pistils enclosed in a hollow receptacle and developing into achenes: lvs. opposite.....Fam. 31. *Calycanthaceae*, 261
GG. Seed with ruminate albumen: fr. berry-like: fls. usually with 3 sepals and 6 petals.....Fam. 32. *Annonaceae*, 262
FF. Stamens 6–12, in whorls; anthers opening by valves: fr. drupaceous, 1-seeded; perianth small, not petaloid.....Fam. 33. *Lauraceae*, 263
CC. Parts of the fl. in whorls.
D. Fls. 4-merous, with 2 short and 4 longer hypogynous stamens: fr. a 2-celled caps., sometimes indehiscent.....Order XIII. RHOEADALES
Fam. 34. *Cruciferae*, 266
DD. Fls. usually 5-merous, stamens 4 to many.
E. Carpels distinct, 1 to many, sometimes united; stamens mostly epigynous or perigynous.....Order XIV. ROSIFLORAE
F. Seeds with endosperm: lvs. usually exstipulate, not compound.
G. Fr. a caps. or berry.
H. Carpels as many as sepals: lvs. alternate: succulent plants.
Fam. 35. *Crassulaceae*, 269
HH. Carpels usually 2–10: plants not succulent.
I. Fr. a thin-walled caps. or berry; carpels 2–10: fls. usually perfect, rarely without petals: lvs. often opposite. Fam. 36. *Saxifragaceae*, 269

II. Fr. a 2-celled caps. with woody or hard walls: fls. often unisexual, sometimes apetalous or naked: lvs. alternate.
Fam. 37. *Hamamelidaceae*, 316

GG. Fr. a 1-seeded samara: fls. naked: tree with milky sap.
Fam. 38. *Eucommiaceae*, 325

FF. Seed without endosperm: lvs. usually stipulate, often compound.
G. Fls monoecious, in dense globose heads: lvs. large, palminerved.
Fam. 39. *Platanaceae*, 325

GG. Fls. perfect, rarely unisexual.
H. Pistils 1 to many, often distinct, developing into achenes or follicles, or connate and forming a pome or drupe; stamens usually perigynous or epigynous.....Fam. 40. *Rosaceae*, 327

HH. Pistil 1, developing into a legume: fls. usually irregular (papilionaceous).
Fam. 41. *Leguminosae*, 479

EE. Carpels united into a compound ovary; stamens hypogynous.
F. Stamens as many as sepals or fewer, rarely more than twice as many as sepals.
G. Stamens twice as many as sepals or as many and opposite the sepals or sometimes fewer.
H. Ovules pendulous with ventral raphe, rarely ascending and with dorsal raphe.....Order XV. GERANIALES
I. Fls. perfect or dioecious or polygamous: lvs. often compound.
J. Fls. regular.
K. Plants without secreting cells: fls. perfect: lvs. pinnate.
Fam. 42. *Zygophyllaceae*, 518

KK. Plants with secreting cells.
L. Lvs. punctate, of aromatic or pungent odor when bruised.
Fam. 43. *Rutaceae*, 518

LL. Lvs. not punctate.
M. Filaments distinct; fls. usually unisexual or polygamous.
Fam. 44. *Simarubaceae*, 526

MM. Filaments usually wholly or partly united; fls. usually perfect.....Fam. 45. *Meliaceae*, 527

JJ. Fls. irregular, papilionaceous.....Fam. 46. *Polygalaceae*, 528

II. Fls. monoecious, often apetalous: fr. capsular, usually of 3 carpels, rarely indehiscent
Fam. 47. *Euphorbiaceae*, 529

HH. Ovules pendulous with dorsal raphe or erect with ventral raphe: disk usually conspicuous.....Order XVI. SAPINDALES
I. Fls. apetalous or with 3 minute petals.
J. Lvs. opposite: petals wanting: fr. capsular or fleshy.
Fam. 48. *Buxaceae*, 531

JJ. Lvs. linear, alternate; petals present: fr. drupaceous, berry-like.
Fam. 49. *Empetraceae*, 533

II. Fls. with petals, rarely apetalous.
J. Lvs. simple, or if compound, plant resiniferous.
K. Each carpel with 1 pendulous ovule.
L. Carpels distinct; fr. separating into 5–8 cocci; lvs. opposite, entire.....Fam. 50. *Coriariaceae*, 534

LL. Carpels connate: fr. a drupe, berry or caps.: lvs. alternate.
M. Plant resiniferous: lvs. often compound.
Fam. 51. *Anacardiaceae*, 535

MM. Plant not resiniferous: lvs. simple.
N. Fr. a caps. or achene: fls. in racemes.
Fam. 52. *Cyrillaceae*, 540

NN. Fr. a drupe: fls. in cymes or solitary.
Fam. 53. *Aquifoliaceae*, 541

KK. Each carpel with 2 or more ovules: fr. a caps. or drupe.
Fam. 54. *Celastraceae*, 547

JJ. Lvs. palmately veined or compound (except in Fam. 59 and in a few species of Fam. 56).
K. Lvs. opposite.
L. Fls. regular.
M. Fr. a bladdery caps.: lvs. pinnate.
Fam. 55. *Staphyleaceae*, 555

MM. Fr. a samara: lvs. simple or compound.
Fam. 56. *Aceraceae*, 558

LL. FLS. irregular: fr. a large leathery caps.
57. *Hippocastanaceae*, 578

KK. Lvs. alternate.
L. Stamens opposite the sepals, or more than sepals.
Fam. 58. *Sapindaceae*, 583

LL. Stamens opposite the petals: lvs. often simple.
Fam. 59. *Sabiaceae*, 585

GG. Stamens as many as sepals and alternating, opposite the petals: carpels 2–5, each with 1–2 ascending ovules.....Order XVII. RHAMNALES
H. Fr. a caps. or drupe; petals involute: lvs. simple, penninerved.
Fam. 60. *Rhamnaceae*, 587

HH. Fr. a berry; petals valvate: lvs. palmately veined or compound.
Fam. 61. *Vitaceae*, 599

FF. Stamens usually numerous: disk inconspicuous or wanting.
G. Sepals usually valvate: placenta usually central: pubescence stellate: tissue with mucilaginous cells.....Order XVIII. MALVALES
H. Stamens numerous.
I. Anthers 2-celled; stamens fascicled or free...Fam. 62. *Tiliaceae*, 612
II. Anthers 1-celled; filaments connate.....Fam. 63. *Malvaceae*, 619
HH. Fertile stamens as many as sepals, connate; anthers 2-celled; petals often wanting or reduced.....Fam. 64. *Sterculiaceae*, 619
GG. Sepals usually imbricate: placentae usually parietal.
Order XIX. PARIETALES
H. Styles usually free.
I. Seeds usually with albumen.
K. Fr. often berry-like: mostly climbing shrubs.
Fam. 65. *Dilleniaceae*, 620
KK. Fr. a caps., sometimes indehiscent: upright shrubs or trees.
L. Sepals and petals 4: lvs. opposite
Fam. 66. *Eucryphiaceae*, 622
LL. Sepals and petals usually 5: lvs. alternate.
Fam. 67. *Theaceae*, 623
II. Seed without albumen.
K. Lvs. usually opposite: styles present.....Fam. 68. *Guttiferae*, 625
KK. Lvs. alternate, small; style wanting or very short: seed with a tuft of hairs.....Fam. 69. *Tamaricaceae*, 630
HH. Styles united.
I. Fls. perfect: fr. capsular.
K. Stamens many.....Fam. 70. *Cistaceae*, 633
KK. Stamens 5.....Fam. 71. *Violaceae*, 639
II. Fls. often unisexual: fr. often berry-like.
K. Sepals and petals usually 5.....Fam. 72. *Flacourtiaceae*, 639
KK. Sepals and petals 4; stamens 8.....Fam. 73. *Stachyuraceae*, 640
BB. Ovary usually inferior (except in Fam. 75, 76 and 77).
C. Sepals and petals numerous: fleshy spiny plants.....Order XX. OPUNTIALES
Fam. 74. *Cactaceae*, 641
CC. Sepals and petals usually 5: plants not fleshy.
D. Ovules several or numerous in each cell (except in Fam. 75 and 76 with superior ovaries): infl. not umbelliform.....Order XXI. MYRTIFLORAE
E. Ovary free, but enclosed in a tubular or campanulate calyx-tube.
F. Ovary 1-celled, 1-ovuled; petals usually wanting.
G. Ovule pendulous: lvs. not scaly.....Fam. 75. *Thymelaeaceae*, 644
GG. Ovule upright: lvs. more or less scaly.....Fam. 76 *Elaeagnaceae*, 648
FF. Ovary 2–6-celled; each cell with 2 to many ovules; petals present.
Fam. 77. *Lythraceae*, 652
EE. Ovary adnate to the calyx-tube.
F. Sepals and petals usually 5.
G. Fr. with 9 carpels in 2 or 3 whorls, large, berry-like; petals 5–7.
Fam. 78. *Punicaceae*, 653
GG. Fr. with the carpels in one whorl.
H. Cells of ovary 1-ovuled: fr. drupaceous.
I. Petals imbricate, small or wanting: ovary 1- or 6–10-celled.
Fam. 79. *Nyssaceae*, 653
II. Petals valvate, 4–10, narrow: ovary 1–2-celled.
Fam. 80. *Alangiaceae*, 655
HH. Cells of ovary 1–8-ovuled: fr. usually capsular or berry-like: aromatic plants.....Fam. 81. *Myrtaceae*, 655
FF. Sepals and petals 4 or 2; calyx-tube cylindric.....Fam. 82. *Onagraceae*, 656
DD. Ovules 1 or rarely 2 in each cell, pendulous: fls. in umbels or corymbs.
Order XXII. UMBELLIFLORAE
E. Fls. 5-merous; styles 2–5: fls. umbellate.
F. Fr. a berry or drupe.....Fam. 83. *Araliaceae*, 657
FF. Fr. dry at maturity; splitting into 2 mericarps...Fam. 84. *Umbelliferae*, 665
EE. Fls. 4-merous; style 1: fls. not umbellate: fr. a drupe...Fam. 85. *Cornaceae*, 665

Subclass. II. SYMPETALAE Petals more or less united (free or nearly so in Fam. 86 and 87 and in some species of Fam. 88, 95, 96 and 99).

A. Ovary superior (except in some genera of Fam. 88 and in Fam. 94).
B. Stamens usually free or adnate only to the base of the corolla, twice as many as the lobes or alternate with the lobes, sometimes inserted at the sinuses of the corolla.
Order I. ERICALES
C. Stamens free or nearly free.
D. Petals free: fr. a caps.
E. Ovary 3-celled: shrubs or trees.....Fam. 86. *Clethraceae*, 673
EE. Ovary 4–5-celled; evergreen subshrubs.....Fam. 87. *Pyrolaceae*, 675
DD. Petals united (distinct in a few genera): fr. a caps., berry or drupe.
Fam. 88. *Ericaceae*, 676
CC. Stamens inserted at the sinuses of the corolla or connate into a tube.
Fam. 89. *Diapensiaceae*, 731
BB. Stamens borne on the corolla.
C. Stamens opposite the lobes and as many or more.

DD. Ovary 1-celled; stamens as many as lobes, usually 5.
E. Ovary with 1 to many ovules, style 1: fr. a drupe or caps.
Order II. PRIMULALES
Fam. 90. *Myrsinaceae*, 731
EE. Ovary with 1 ovule; styles 5: fr. an achene.....Order III. PLUMBAGINALES
Fam. 91. *Plumbaginaceae*, 732
DD. Ovary 2–5-celled; corolla-lobes often 4.....Order IV. EBENALES
E. Ovary completely 2–5-celled; stamens usually as many as corolla-lobes.
Fam. 92. *Sapotaceae*, 733
EE. Ovary incompletely 2–5-celled, 1-celled above.
F. Styles 2–8; fls usually unisexual; stamens as many or more than corolla-lobes.
Fam. 93. *Ebenaceae*, 733
FF. Style 1; fls. usually perfect.
G. Stamens usually many; ovary inferior or half-inferior.
Fam. 94. *Symplocaceae*, 735
GG. Stamens twice as many as corolla-lobes .....Fam. 95. *Styracaceae*, 736
CC. Stamens alternate with the lobes, as many or fewer.
D. Corolla not scarious, sometimes wanting.
E. Carpels 2, often distinct; corolla usually regular, the stamens usually inserted at base; lobes usually convolute: lvs. usually opposite....Order V. CONTORTAE
F. Stamens usually 2; corolla sometimes wanting: stipules wanting.
Fam. 96. *Oleaceae*, 739
FF. Stamens as many as corolla-lobes.
G. Carpels connate into a usually 2-celled ovary: stipules or stipular line present: sap not milky.....Fam. 97. *Loganiaceae*, 766
GG. Carpels usually distinct, or often united at apex: fr. of 2 follicles: sap milky.
H. Carpels united at least at apex; stamens distinct; pollen granular.
Fam. 98. *Apocynaceae*, 769
HH. Carpels distinct; stamens usually connate; pollen united into waxy masses or groups of 4.....Fam. 99. *Asclepiadaceae*, 770
EE. Carpels 2 or 3, rarely 4 or 5, united; corolla often irregular; lobes imbricate; stamens usually adnate to the mostly elongated corolla-tube: lvs. opposite or alternate.....Order VI. TUBIFLORAE
F. Ovary 3-celled: corolla regular, convolute.....Fam. 100. *Polemoniaceae*, 772
FF. Ovary 2 or 4-celled: corolla with imbricate lobes.
G. Carpels 1–2-seeded, usually separating into 4 nutlets.
H. Corolla regular; stamens 5.....Fam. 101. *Boraginaceae*, 773
HH. Corolla irregular, rarely regular; stamens 4, usually didynamous.
I. Ovary not lobed, the style at apex; corolla sometimes regular.
Fam. 102. *Verbenaceae*, 775
II. Ovary 4-lobed, the style basal or nearly so; corolla 2-lipped.
Fam. 103. *Labiatae*, 778
GG. Carpels usually with many ovules, connate into a 2-celled ovary, rarely 1-celled and 1-ovuled.
H. Stamens 5: fls. regular: fr. a caps. or berry..Fam. 104. *Solanaceae*, 782
HH. Stamens usually 2 or 4: fls. irregular.
I. Ovary many-ovuled.
J. Seeds albuminous; placenta central.
Fam. 105. *Scrophulariaceae*, 785
JJ. Seeds without albumen, usually with large wings; placenta parietal or central: usually climbing shrubs or trees.
Fam. 106. *Bignoniaceae*, 788
II. Ovary 1- or 2-celled; cells 1-ovuled: fr. a nutlet: subshrubs.
Fam. 107. *Globulariaceae*, 792
DD. Corolla scarious, nerveless, 4-lobed; stamens 4: fr. a circumscissile caps. or a nutlet.....Order VII. PLANTAGINALES
Fam. 108. *Plantaginaceae*, 792
AA. Ovary inferior.
B. Anthers free, rarely coherent: lvs. opposite.....Order VIII. RUBIALES
C. Stamens as many as corolla-lobes: ovary 2- or several-celled.
D. Lvs. with interpetiolar stipules, entire.....Fam. 109. *Rubiaceae*, 793
DD. Lvs. without stipules or stipules adnate to the petiole: lvs. entire, serrate or compound.....Fam. 110. *Caprifoliaceae*, 795
CC. Stamens 4 or less: ovary 1-celled, 1-ovuled.....Fam. 111. *Dipsaceae*, 842
BB. Anthers more or less united: fls. (in Fam. 112) aggregate on a receptacle surrounded by an involucre; ovary 1-celled and 1-ovuled.....Order IX. CAMPANULATAE
Fam. 112. *Compositae*, 842

ANALYTICAL KEY TO THE FAMILIES AND ABERRANT GENERA

Ovules not enclosed in an ovary: trees and shrubs with unisexual fls. and usually needle-shaped lvs.

A. Seeds solitary or rarely 2, berry- or drupe-like: lvs. alternate.
B. Lvs. fan-shaped, deciduous: fr. yellow, drupe-like ..... *Ginkgoaceae*, 1
BB. Lvs. needle-shaped or linear, persistent ..... *Taxaceae*, 1
AA. Seeds several or many, forming a dry cone rarely berry-like and with 1 or few seeds.
B. Fr. a dry woody cone with often winged seeds between the scales or berry-like through union of the fleshy scales: lvs. needle-shaped or scale-like, alternate, opposite or ternate. *Pinaceae*, 7
BB. Fr. nut-like, inclosed by the fleshy bracts which form a small fleshy strobile: lvs. in distant pairs, usually reduced to minute scales, rarely with linear blade .... *Gnetaceae*, 66

Ovules enclosed in an ovary.

I. Lvs. parallel-veined: parts of fl. usually in whorls of 3: stems without clear distinction of bark, wood and pith.

A. Fls. without perianth or the perianth reduced to 1–3 minute scales: lvs. usually linear: stems usually hollow ..... *Gramineae*, 68
AA. Fls. with perianth.
B. Stem usually unbranched, with large and stiff fan-shaped lvs. at apex: fls. small, in a branched spadix ..... *Palmae*, 75
BB. Stem usually branched: lvs. not fan-shaped: fls. not in a spadix ..... *Liliaceae*, 76

II. Lvs. net-veined: parts of fl. mostly in whorls of 5, sometimes of 4, rarely of 3 or 2: stems with clear distinction of bark, wood and pith.

1. *Fls. without corolla* (2, see on p. xxxiv).

A. Fls., at least the staminate ones, in catkins.
B. Fls. of both sexes in catkins, without calyx; ovary superior or naked: lvs. simple, alternate.
C. Fr. a many-seeded caps ..... *Salicaceae*, 82
CC. Fr. 1-seeded.
D. Style with 2 stigmas: lvs. often toothed.
E. Each scale with a single pistillate fl.; catkins upright ..... *Myricaceae*, 123
EE. Each scale with 2 or 3 pistillate fls.; staminate catkins mostly pendulous. *Betulaceae*, 133
DD. Style not cleft, stigmatic above: lvs. entire ..... *Leitneriaceae*, 124
BB. Fls., at least one sex, with calyx, usually only those of one sex in catkins.
C. Ovary superior.
D. Fr. fleshy, drupaceous. (See also *Rhus* sp. 13 and 14 on p. 539.)
E. Pistillate fls. without perianth; those of both sexes in catkins: lvs. opposite. *Garryaceae*, 122
EE. Pistillate fls. with perianth; only staminate fls. in catkins: lvs. alternate. *Moraceae*, 196
DD. Fr. a caps.: styles and stamens 4 ..... *Tetracentron*, 261
CC. Ovary inferior.
D. Lvs. pinnate ..... *Juglandaceae*, 125
DD. Lvs. simple.
E. Fr. a nut ..... *Fagaceae*, 155
EE. Fr. a caps.
F. Fls. sessile, apetalous ..... *Sinowilsonia*, 323
FF. Fls. pediceled, with minute petals ..... *Fortunearia*, 322
AA. Fls. not in catkins.
B. Fls., at least staminate ones, without calyx or with indistinct calyx.
C. Fls. in globular heads.
D. Lvs. palmately lobed.
E. Fr. a nutlet ..... *Platanaceae*, 325
EE. Fr. a dehiscent 2-celled caps ..... *Liquidambar* 317
DD. Lvs. ovate, not lobed: fr. a drupe: head of many staminate and 1 pistillate fl. *Davidia*, 654
CC. Fls. not in heads; carpels many.
D. Lvs. alternate.
E. Fr. drupaceous or of several 1- celled samaras ..... *Trochodendraceae*, 212
EE. Fr. a 2-celled samara ..... *Eucommiaceae*, 325
DD. Lvs. opposite: fr. a dehiscent many-seeded pod ..... *Cercidiphyllaceae*, 213
BB. Fls. with calyx.
C. Carpels distinct or nearly so, 2 or more.
D. Sepals petaloid.

E. Sepals valvate, usually 4.....*Clematis*, 216
EE. Sepals imbricate, 6 or more.
F. Lvs. alternate.
G. Lvs. compound: climbing shrubs.....*Lardizabalaceae*, 229
GG. Lvs. simple.....*Magnoliaceae*, 252
FF. Lvs. opposite: sepals many, spirally arranged.....*Calycanthaceae*, 261
DD. Sepals not petaloid.
E. Lvs. simple, palminerved: fr. a dehiscent dry pod.....*Firmiana*, 620
EE. Lvs. compound: fr. a dehiscent pod or drupe.
F. Lvs. not dotted: climbing shrubs.....*Lardizabalaceae*, 229
FF. Lvs. with transparent dots: upright shrubs or trees.....*Rutaceae*, 518
CC. Carpels united into a 1-many-celled ovary.
D. Ovary superior, free from the calyx.
E. Lvs. alternate.
F. Cells of ovary with 1 or 2 ovules.
G. Fls., at least the pistillate, in globose heads or inclosed in a pyriform receptacle: fls. 4-merous.
H. Trees or shrubs with milky juice: heads large, solitary..*Moraceae*,196
HH. Subshrubs without milky juice: heads small, in cymes..*Debregeasia*, 201
GG. Fls. not in heads, nor inclosed in a receptacle.
H. Anthers opening by pores: aromatic trees or shrubs.....*Lauraceae*, 263
HH. Anthers opening by slits.
I. Stamens as many and alternating with the sepals...*Rhamnaceae*, 587
II. Stamens opposite the sepals or numerous.
J. Styles or stigmas 2 or 3.
K. Fls. unisexual or polygamous (bisexual only in *Ulmus*).
L. Styles 2 or 1: lvs. usually serrate: fls. monoecious.
M. Styles usually 2: fr. a samara, nut or drupe: trees or large shrubs.....*Ulmaceae*, 183
MM. Style 1: fr. a nutlet: subshrub.....*Boehmeria*, 201
LL. Styles 3 or 2: fr. a caps. or drupe; shrubs or subshrubs with usually entire lvs.
M. Lvs. simple.
N. Fls. dioecious; stamens 5–18: lvs. entire *Euphorbiaceae*,529
NN. Fls. monoecious; stamens 4–6.....*Buxaceae*, 531
MM. Lvs. pinnate: fls. dioecious, stamens 3–5.....*Pistacia*, 535
KK. Fls. usually bisexual: low shrubs.
L. Stipules not sheathing: fr. an utricle, sometimes fleshy.
Chenopodiaceae, 208
LL. Stipules sheathing: fr. a dry achene.....*Polygonaceae*, 205
JJ. Style and stigma 1: calyx campanulate to tubular.
K. Stamens many: fr. a long-tailed achene.....*Cercocarpus*, 424
KK. Stamens as many or twice as many as calyx-lobes: fr. a berry.
Thymelaeaceae, 644
FF. Cells of ovary with several ovules.
G. Ovary several-celled.....*Sterculiaceae*, 619
GG. Ovary 1-celled.....*Flacourtiaceae*, 639
EE. Lvs. opposite.
F. Fr. dehiscent, of 3 2-seeded carpels: lvs. entire.....*Buxus*, 532
FF. Fr. not dehiscent.
G. Fr. a drupe or berry.....*Rhamnaceae*, 587
GG. Fr. a samara.
H. Samara 1-celled.....*Oleaceae*, 739
HH. Samara 2-celled.....*Aceraceae*, 558
DD. Ovary inferior or half-inferior or permanently inclosed in the calyx-tube.
E. Fr. a dehiscent caps.
F. Ovary 6-celled; calyx tubular, corolla-like: climbing shrubs.
Aristolochiaceae, 204
FF. Ovary 2-celled; calyx of distinct sepals; upright shrubs.*Hamamelidaceae*, 316
EE. Fr. a drupe or rarely an achene; ovary 1-celled.
F. Plant more or less covered with peltate or stellate scales...*Elaeagnaceae*, 648
FF. Plant not scaly.
G. Fls. in clusters on axillary peduncles; stamens 5–12: lvs. alternate: trees.
Nyssaceae, 653
GG. Fls. axillary, subsessile or in spikes: lvs. often opposite: parasitic shrubs.
H. Parasitic on brs. of trees: fr. a berry: lvs . opposite....*Loranthaceae*, 202
HH. Parasitic on roots: fr. a drupe or achene: lvs. alternate or opposite.
Santalaceae, 201

2. *Fls. with a corolla consisting of separate petals* (3, see p. xxxvi).

A. Stamens numerous, at least more than 10.
B. Ovary superior.
C. Pistils several to many, distinct or united only at base.
D. Stamens inserted on the disk or on the axis.
E. Sepals and petals imbricated, petals large.
F. Fr. a pod or an achene.
G. Carpels 1- or 2-ovuled.....*Magnoliaceae*, 252
GG. Carpels many-ovuled: fr. a dehiscent several-seeded pod.....*Paeonia*, 214
FF. Fr. a 1-seeded drupe; petals usually 6, small.....*Menispermaceae*, 250

EE. Sepals and petals valvate, in whorls of 3: carpels developing into many-seeded berries ..... *Annonaceae*, 262
DD. Stamens inserted on the calyx.
E. Lvs. alternate; sepals and petals unlike, in whorls of 5 ..... *Rosaceae*, 327
EE. Lvs. opposite; sepals gradually changing into petals spirally arranged. *Calycanthaceae*, 261
CC. Pistil 1, consisting usually of 2 to many connate carpels.
D. Lvs. opposite; fr. capsular.
E. Lvs. punctate with pellucid dots: styles 3–5, usually distinct: ovary 1–5-celled. *Guttiferae*, 625
EE. Lvs. not dotted.
F. Styles 5–18; petals 4: lvs. evergreen, pinnate ..... *Eucryphiaceae*, 622
FF. Style 1, with simple or 3-lobed stigma; petals 5 or 3 ..... *Cistaceae*, 623
DD. Lvs. alternate.
E. Ovary 1-celled.
F. Lvs. compound: fr. a legume ..... *Albizzia*, 481
FF. Lvs. simple: fr. a berry or caps. ..... *Flacourtiaceae*, 639
EE. Ovary with 2 or more cells.
F. Sepals imbricate.
G. Style 1 or sometimes 5.
H. Fls. 5-merous.
I. Fr. a 1–2-seeded drupe ..... *Sabiaceae*, 585
II. Fr. a caps.: fls. large ..... *Theaceae*, 623
HH. Fls. 4-merous: fr. a many-seeded berry ..... *Stachyuraceae*, 640
GG. Styles more than 5: fr. a berry: twining shrubs ..... *Dilleniaceae*, 620
FF. Sepals valvate.
G. Fr. a dehiscent many-seeded caps.: fls. showy ..... *Malvaceae*, 619
GG. Fr. indehiscent: fls. rather small ..... *Tiliaceae*, 612
BB. Ovary inferior.
C. Plants with thick fleshy stems and usually spiny, without foliage lvs.: fls. with many sepals and petals ..... *Cactaceae*, 641
CC. Plants not fleshy.
D. Lvs. with stipules ..... *Rosaceae*, 327
DD. Lvs. without stipules.
E. Sepals and petals connate and falling off as a lid: fr. a caps.: plants aromatic. *Myrtaceae*, 655
EE. Sepals and petals not connate.
F. Lvs. alternate: fr. drupe- or pome-like.
G. Petals red: ovary 9-celled, many-seeded ..... *Punicaceae*, 653
GG. Petals white or yellow: ovary 1–3-celled: fr. a usually 1-seeded drupe. *Symplocaceae*, 735
FF. Lvs. opposite: fr. a caps. ..... *Saxifragaceae*, 269
AA. Stamens not more than twice as many as petals.
B. Ovary superior.
C. Carpels 2 or more, distinct or somewhat united.
D. Stamens inserted on the calyx, perigynous.
E. Lvs. without stipules ..... *Saxifragaceae*, 269
EE. Lvs. with stipules ..... *Rosaceae*, 327
DD. Stamens inserted on the axis, hypogynous.
E. Lvs. simple.
F. Lvs. alternate: fr. capsular: plant fleshy ..... *Crassulaceae*, 269
FF. Lvs. opposite or whorled: fr. fleshy ..... *Coriariaceae*, 534
EE. Lvs. compound.
F. Lvs. with pellucid dots ..... *Rutaceae*, 518
FF. Lvs. not dotted.
G. Lfts. 3–7: low shrub ..... *Zanthorhiza*, 215
GG. Lfts. 7–41: trees ..... *Simaroubaceae*, 526
CC. Carpels united, forming a 1–many-celled ovary.
D. Ovary 1-celled.
E. Ovules 2–many, parietal.
F. Placenta 1: fls. usually irregularly: fr. a pod ..... *Leguminosae*, 479
FF. Placentas 2 or more; stamens 5.
G. Lvs., at least the lower ones, opposite.
H. Lvs. with pellucid dots ..... *Guttiferae*, 625
HH. Lvs. without pellucid dots ..... *Cistaceae*, 633
GG. Lvs. alternate.
H. Lvs. small, scale-like: fr. a caps; seeds bearded ..... *Tamaricaceae*, 630
HH. Lvs. broad: seeds not bearded.
I. Stamens not connate ..... *Saxifragaceae*, 269
II. Stamens connate: lvs. entire, coriaceous ..... *Violaceae*, 639
EE. Ovules 1–many, not parietal.
F. Lvs. opposite: subshrubs ..... *Caryophyllaceae*, 212
FF. Lvs. alternate.
G. Fr. a berry, usually few-seeded; stamens 6 ..... *Berberidaceae*, 232
GG. Fr. a 1-seeded drupe; stamens 5 ..... *Anacardiaceae*, 535
DD. Ovary 2–many-celled.
E. Fls. irregular.
F. Anthers opening by pores: lvs. simple.

GG. Stamens adnate below to the corolla: fls. papilionaceous. *Polygalaceae*, 528
GG. Stamens free; fls. not papilionaceous. *Rhododendron*, 679
FF. Anthers opening by slits: lvs. compound.
G. Lvs. digitate. *Hippocastanaceae*, 578
GG. Lvs. pinnate or bipinnate. *Sapindaceae*, 583
EE. Fls. regular or nearly so.
G. Lvs. opposite or whorled.
H. Fr. a samara.
I. Fr. a simple samara: lvs. pinnate, very rarely simple. *Fraxinus*, 741
II. Fr. a double samara: lvs. simple, usual-palmately lobed, rarely pinnate. *Aceraceae*, 558
HH. Fr. a caps.
I. Calyx 4–5-parted; stamens 4–5.
J. Lvs. simple. *Celastraceae*, 547
JJ. Lvs. compound. *Staphyleaceae*, 555
II. Calyx tubular; stamens 8–10. *Lythraceae*, 652
GG. Lvs. alternate.
H. Lvs. compound.
I. Fr. a drupe or dry: upright trees or shrubs.
J. Lvs. pinnate or bipinnate.
K. Stamens 5 or 10, connate at least at base: lvs. pinnate or bipinnate. *Meliaceae*, 527
KK. Stamens 8, free: lvs. pinnate. *Sapindaceae*, 583
JJ. Lvs. 2–3-foliolate: fr. dry, indehiscent.
K. Lfts. 2. *Zygophyllaceae*, 518
KK. Lfts. 3. *Ptelea*, 522
II. Fr. a 1–several-seeded berry; climbing shrubs. *Vitaceae*, 599
HH. Lvs. simple.
I. Stamens 6, 4 long and 2 shorter ones: fr. a 2-celled pod. *Cruciferae*, 266
II. Stamens of equal length.
J. Fr. a caps. or achene.
K. Styles 2–3.
L. Fls. unisexual; styles 3, 2-cleft, slender. *Andrachne*, 529
LL. Fls. perfect.
M. Styles 2–3, very short; fr. indehiscent. *Cyrillaceae*, 540
MM. Styles 3, slender: fr. dehiscent. *Clethraceae*, 673
KK. Style 1.
L. Style short. *Pyrolaceae*, 675
LL. Style slender.
M. Fr. berry-like: climbing shrubs. *Clematoclethra*, 622
MM. Fr. a caps.: upright or prostrate shrubs. *Ericaceae*, 676
JJ. Fr. a drupe or berry.
K. Lvs. stipulate, small, fleshy: fr. 1-seeded. *Nitraria*, 518
KK. Lvs. exstipulate: fr. several-seeded.
L. Fls. 3-merous, dioecious: heath-like shrubs. *Empetraceae*, 533
LL. Fls. 4–5-merous, perfect or polygamous: not heath-like.
M. Fr. a drupe: lvs. penninerved, simple: upright trees or shrubs. *Aquifoliaceae*, 541
MM. Fr. a berry: lvs. palminerved or compound: climbing shrubs. *Vitaceae*, 599
BB. Ovary inferior.
C. Lvs. stipulate: fr. a pome. *Rosaceae*, 327
CC. Lvs. exstipulate.
D. Cells of ovary several- to many-ovuled.
E. Style 1; fls. 4-merous. *Onagraceae*, 656
EE. Styles 2–5, usually connate below: fls. usually 5-merous. *Saxifragaceae*, 269
DD. Cells of ovary 1–2-ovuled.
E. Fr. a 2-celled caps.; styles 2: pubescence stellate. *Hamamelidaceae*, 316
EE. Fr. not a caps.
F. Styles 2–5, sometimes connate: fls. in umbels: lvs. alternate.
G. Fr. dry, splitting at maturity in 2; styles 2. *Umbelliferae*, 665
GG. Fr. berry-like; styles 2–5. *Araliaceae*, 657
FF. Styles 1: lvs. often opposite.
G. Petals and stamens usually 6: lvs. usually lobed, alternate *Alangiaceae*, 655
GG. Petals and stamens 4 or 5: lvs. never lobed, often opposite. *Cornaceae*, 665

3. *Fls. with gamopetalous corolla.*

A. Ovary superior.
B. Stamens twice as many as corolla-lobes or more.
C. Stamens free or nearly so.
D. Caps. 3-celled; style slender with 3 stigmas; corolla divided nearly or quite to base. *Clethraceae*, 673
DD. Caps. 5-celled.
E. Style thick, shorter than ovary. *Pyrolaceae*, 675
EE. Style slender, longer than ovary. *Ericaceae*, 676
CC. Stamens attached to the tube of the corolla.
D. Filaments free; styles 4. *Ebenaceae*, 733
DD. Filaments more or less united.

EE. Anthers 2-celled; stamens united into fascicles.
F. Ovary partly inferior; pubescence stellate: fr. a dry drupe...*Styracaceae*, 736
FF. Ovary superior: fr. a caps.....*Theaceae*, 623
EE. Anthers 1-celled; stamens united into a tube.....*Malvaceae*, 619
BB. Stamens as many as corolla-lobes or fewer.
C. Stamens as many as corolla-lobes and opposite them.
D. Style 1.
E. Ovary 2–5-celled: corolla-lobes with small appendages at base: fr. a drupe.
Sapotaceae, 733
EE. Ovary 1-celled; corolla without appendages: fr. a berry-like drupe.
Myrsinaceae, 731
DD. Styles 5; ovary 1-celled: fr. a 1-seeded utricle.....*Plumbaginaceae*, 732
CC. Stamens as many as corolla lobes and alternate or fewer.
D. Corolla regular.
E. Stamens as many as corolla-lobes.
F. Ovaries 2, distinct, or 1 and deeply 4-lobed.
G. Lvs. opposite: ovaries 2.
H. Stamens distinct; carpels usually united at apex.....*Apocynaceae*, 769
HH. Stamens united: carpels distinct.....*Asclepiadaceae*, 770
GG. Lvs. alternate: ovary 1, deeply 4-lobed.....*Boraginaceae*, 773
FF. Ovary 1, not deeply 4-lobed.
G. Stamens 4.
H. Lvs. opposite.
I. Petioles with stipules or connected by a stipular line: fr. a caps.
Loganiaceae, 766
II. Petioles without stipules or stipular line: fr. a drupe or berry.
Verbenaceae, 775
HH. Lvs. alternate, linear: corolla scarious.....*Plantaginaceae*, 792
GG. Stamens 5: lvs. usually alternate.
H. Stamens free from the corolla or between the corolla-lobes.
I. Style present.
J. Stamens free.....*Ericaceae*, 676
JJ. Stamens between the corolla-lobes: low cespitose or prostrate subshrubs.....*Diapensiaceae*, 731
II. Style none: fr. a drupe.....*Aquifoliaceae*, 541
HH. Stamens attached to the corolla-tube.
I. Styles with 3 stigmas: fr. a caps.....*Polemoniaceae*, 772
II. Styles with 2 stigmas or undivided.
J. Fr. a 4-seeded drupe: fls. small, whitish, in large panicles *Ehretia*, 773
JJ. Fr. a many-seeded berry: fls. in cymes, fascicles or solitary.
Solanaceae, 782
EE. Stamens fewer than corolla-lobes: lvs. opposite.
F. Fls. not in racemes; floral lvs. opposite: fr. a drupe or caps. ....*Oleaceae*, 739
FF. Fls. in terminal or axillary racemes; floral lvs. alternate: fr. a caps. *Veronica*, 787
DD. Corolla irregular.
E. Fertile stamens 5: lvs. alternate.....*Ericaceae*, 676
EE. Fertile stamens 2 or 4: lvs. usually opposite.
F. Ovules solitary in each cell.
G. Lvs. opposite: ovary 2–4-celled.
H. Ovary 4-lobed, with the style between the lobes .....*Labiatae*, 778
HH. Ovary not lobed.....*Verbenaceae*, 775
GG. Lvs. alternate: ovary 1–2-celled.....*Globulariaceae*, 792
FF. Ovules many in each cell.
G. Placentae axial.....*Scrophulariaceae*, 785
GG. Placentae parietal: trees or climbers.....*Bignoniaceae*, 788
AA. Ovary inferior.
B. Anthers distinct, rarely slightly cohering.
C. Stamens 8–16.
D. Fr. a berry or berry-like drupe: stamens free.....*Ericaceae*, 676
DD. Fr. a dry drupe: stamens united at base.....*Styracaceae*, 736
CC. Stamens 4 or 5.
D. Ovary 1-celled; fls. in heads: low subshrub.....*Dipsaceae*, 842
DD. Ovary 2–5-celled.
E. Lvs. stipulate or with a stipular line.....*Rubiaceae*, 793
EE. Lvs. exstipulate, rarely on vigorous brs. with stipules.....*Caprifoliaceae*, 795
BB. Anthers united into a tube inclosing the style: fls. in a dense involucrate head.
Compositae, 842

DESCRIPTION OF TREES AND SHRUBS

Subdivision I. GYMNOSPERMAE Lindl. GYMNOSPERMS

Trees or shrubs with needle-shaped or scale-like, rarely fan-shaped or oblong to elliptic, mostly evergreen lvs. and unisexual fls.: ovules not enclosed in an ovary.

1. GINKGOACEAE Engl. GINKGO FAMILY

Resinous tree; secondary wood without true vessels: lvs. deciduous, fan-shaped, parallel-veined: fls. dioecious, the staminate catkin-like, the anthers borne in stalked pairs on a slender axis; the fertile long-stalked with usually 2 ovules; fecundation by motile sperm-cells: fr. drupe-like, with a fleshy outer and a bony inner coat; embryo with 2 cotyledons. (Ginkgo, the Chinese name of the tree.)—One monotypic genus in China.

GINKGO L. Ginkgo. Characters of the family. One species.

G. bíloba L. Tree to 40 m., glabrous: lvs. alternate, partly in clusters of 3–5 on spurs, slender-stalked, fan-shaped, more or less incised or divided at the broad summit, 5–8 cm. across: fr. obovoid or ellipsoid, about 2.5 cm. long, yellowish, consisting of an ovoid angular nut surrounded by a pulpy ill-smelling and acrid outer coat; kernel sweet. Fl.v; fr.x. S.I.1:t.5(c). E.H.1:t.21–23(h). S.N.71(h). (*Salisburia adiantifolia* Sm.—Maidenhair Tree.) E. China, cult. in Japan. Intr. about 1730, about 1784 to Am. Zone IV.—A rather sparsely branched picturesque tree, sometimes planted as a street tree; the nuts are edible.—Var. **fastigiàta** Mast. Brs. ascending, forming a narrow-pyramidal or columnar head. Gn.M.31:383(h).—Var. **péndula** Carr. Brs. pendulous. R.H.1907:272(h). M.G.16:164(h).—Var. **laciniàta** Carr. Lvs. larger, deeply incised and divided. F.S.10:119.—Var. **variegàta** Carr. Lvs. yellowish-variegated.—Var. **aûrea** Beiss. Lvs. bright yellow.

2. TAXACEAE Lindl. YEW FAMILY.

Resinous trees or shrubs; secondary wood without true vessels: lvs. persistent, alternate, rarely opposite, often 2-ranked, needle- or scale-like, rarely broad, entire: fls. dioecious, rarely monoecious, the staminate cone-like, with the anthers borne on peltate or apically thickened scales; ovules usually solitary, inverted or erect: fr. consisting of a seed with a bony shell, partly or wholly surrounded by a usually fleshy aril; embryo with 2 cotyledons.—Eleven genera with about 100 species in the temperate, subtropical and tropical regions of both hemispheres.

A. Anthers 2-celled.
B. Seeds several, enclosed in a cone-like fr.: lvs. 1–2.5 cm. long, with 2 glaucous bands beneath ..... 1. *Saxegothaea*
BB. Seeds solitary, free, drupe-like, borne on a usually fleshy stalk: lvs. pale green beneath. 2. *Podocarpus*
AA. Anthers 3–8-celled.
B. Female fls. consisting of several pairs of 2-ovuled carpels: fr. drupe-like: lvs. with 2 glaucous lines below broader than the 3 green lines: brts. opposite: pith with a resin-duct in the centre ..... 3. *Cephalotaxus*
BB. Female fls. reduced to a single ovule.
C. Fr. drupe-like: anthers 4-celled: lvs. with 2 glaucous lines below narrower than the 3 green lines: brts. subopposite ..... 4. *Torreya*
CC. Fr. berry-like, consisting of a bony seed surrounded by the campanulate fleshy aril open at the apex: anthers 6-celled: lvs. pale green beneath: brts. alternate. 5. *Taxus*

1. **SAXEGOTHAÈA** Lindl. Tree with whorled brs.: lvs. linear, indistinctly 2-ranked: fls. monoecious, the staminate in axillary cylindric spikes near the apex of the brts., the female with imbricate carpels, terminating short brts.: fr. subglobose, cone-like, consisting of fleshy connate carpels terminating in broad spine-like points. (After Prince Albert of Saxe-Coburg-Gotha, consort of Queen Victoria.)—One species in Chile.

S. conspícua Lindl. Tree to 14 m.: lvs. linear to linear-lanceolate, 1–2.5 cm. long, acute, abruptly narrowed at base into a short decurrent stalk: staminate fls. 6 mm. long: fr. 1–2 cm. across; seeds broad-ovoid, compressed, 2-edged, about 4 mm. long. B.M.8664(c). D.J.61(h). Chile. Intr. 1847. Zone VIII?—A densely branched small tree with spreading brs. and pendulous brts.

2. **PODOCÁRPUS** L'Hérit. Trees, rarely shrubs: lvs. alternate, sometimes opposite, linear to ovate, rarely scale-like: fls. dioecious, rarely monoecious, the staminate catkin-like, axillary, solitary or fascicled, rarely spicate, the female solitary, axillary, rarely at the end of short brts. or in spikes, consisting of 1 or 2 1-ovuled scales with several bracts at the base which usually become much thickened at maturity and form a fleshy receptacle bearing at the top the globular or ovoid, drupe- or nut-like seed. (Greek *pous, podos,* foot, and *karpos* fruit; in reference to the fleshy fr.-stalks of many species.) About 60 species chiefly in the mts. of trop. and subtrop. regions.

A. Lvs. 5–10 cm. long, with a raised midrib above, usually acute: female fls. solitary.
B. Lvs. abruptly pointed or obtusish, with a prominent midrib beneath. 1. *P. macrophylla*
BB. Lvs. gradually tapering into a fine point; midrib beneath not prominent. 2. *P. salígna*
AA. Lvs. 6–30 mm. long, obtusish or abruptly pointed; midrib not raised above.
B. Lvs. 6–12 mm. long: fls. solitary ..... 3. *P. alpina*
BB. Lvs. 8–30 mm. long: fls. in spikes ..... 4. *P. andina*

1. **P. macrophýlla** D. Don. Tree to 20 m.; trunk with gray, shallowly fissured shreddy bark: lvs. linear-lanceolate, 7–10 cm. long, attenuate at the ends, dark green and glossy above, yellowish green or somewhat glaucescent beneath: staminate fls. fascicled, about 3 cm. long: fr. ovoid, about 1 cm. long, greenish or purplish, on a fleshy purple receptacle. Fl.v; fr.ix–x. S.Z.2:t.133(c). S.I.1:t.13(c). (*P. longifolia* Hort.) Japan. Intr. 1804. Zone VIII.—A tree with spreading short brs. and very dark green lvs.—Var. **máki** Sieb. Usually shrubby, with ascending brs.: lvs. crowded, smaller, 4–7 cm. long, obtusish. S.Z.2:t.134(c). (*P. Makoyi* Bl., *P. chinensis* Sweet, *P. japonica* Sieb.) China; cult. in Japan. Intr. 1840. Tenderer than the type. With some variegated forms.—Var. **appréssa** Matsum. Low bush with spreading brs.: lvs. scarcely exceeding 3.5 cm.; midrib above indistinct. (*P. a.* Maxim.) Cult. in Japan.

2. **P. salígna** D. Don. Tree to 20 m., in cult. often shrubby; brts. green: lvs. linear-lanceolate, 5–10 cm. long, usually slightly falcate, tapering toward

the apex, pointed, dark bluish green above, pale beneath: staminate fls. solitary, often crowded, 2.5 cm. long: fr. ovoid, 8 mm. long, solitary or in pairs on a stalk about 1 cm. long. Fl.IV; fr.XII–I. D.J.41. G.C.III.31:115(h). (*P. chilina* Rich., *P. andina* Hort., not Poepp.) Chile. Intr. 1853. Zone VIII?

3. **P. alpìna** R. Br. Dense shrub or low tree, to 5 m.: brts. slender, whorled: lvs. indistinctly 2-ranked, linear-spatulate to linear-oblong, 6–12 mm. long, narrowed at base, obtuse at apex, sometimes mucronulate, dull green above, paler beneath: fls. dioecious; staminate fls. clustered, 4–8 mm. long: fr. ovoid, 5–6 mm. long, rèd. Fl.III–IV. Tasmania, N. S. Wales. Cult. 1880. Zone VIII?

4. **P. andìna** Poepp. Tree to 5 or occasionally to 15 m.; brts. green: lvs. indistinctly 2-ranked, nearly sessile, linear, 1–3.5 cm. long, tapering at base, obtuse or abruptly pointed, dark green above, with 2 glaucous bands beneath: fls. in spikes, monoecious, staminate spike about 2.5 cm. long: fr. ovoid, yellowish white, 2 cm. long, usually only one developed in a spike. E.P. IV. 5:65. G.C.III.63:12(h),17. J.L.37:50,t(h). (*Prumnopitys elegans* Phil.) Chile. Intr. 1860. Zone VIII?—Small bushy tree with ascending and spreading much ramified brs. forming usually a dense round bush.

3. **CEPHALOTÁXUS** Sieb. & Zucc. PLUM-YEW. Trees or shrubs; brts. opposite; pith with a resin-duct in the centre; winter-buds with numerous imbricate persistent scales: lvs. dense, spirally arranged, but spreading in 2 planes, with 2 broad glaucous bands beneath and with a prominent midrib above: fls. dioecious, occasionally monoecious, axillary, the staminate in globose heads in the axils of lvs., the female in the axils of scales at base of the brts., consisting of several pairs of 2-ovuled carpels: seeds 1 or 2 on a stalk, ellipsoid, drupaceous, about 2.5 cm. long, greenish or purplish, ripening the second season. (Greek *kephale*, head, and *taxus*; referring to the shape of the staminate fls.) Five species in E. Asia.

A. Lvs. abruptly pointed, 2–5 cm. long, in semi-erect ranks. . . . . 1. *C. drupacea*
AA. Lvs. gradually tapering to a fine point, 5–8 cm. long, in nearly horizontally spreading ranks. . . . . 2. *C. Fortuni*

1. **C. drupàcea** Sieb. & Zucc. Small tree, to 10 m., with spreading brs.; bark gray, fissured into narrow detachable strips: lvs. linear, 2–4.5 cm. long, abruptly pointed, dark green above, with 2 grayish bands below, each with about 15 rows of stomata, 2-ranked, but semi-erect so as to form a V-shaped trough: heads of male fls. short-stalked, with the stalk 8 mm. long: fr. ovoid or obovoid, rarely globose (f. **sphaeràlis** Pilg.), 2.5–3 cm. long, 2 cm. across, green, on a stalk 6–12 mm. long. Fl.III–V; fr.IX. B.M.8285(c). S.I.1:t.14(c). Japan. Intr. 1830. Zone V.—In cult. usually a shrub of irregular habit with spreading brs., but at its best it is a small tree with wide-spreading brs. forming a broad round head.—Var. **fastigiàta** Pilger. With upright or ascending brs., often columnar: lvs. spirally arranged, not 2-ranked. G.C.III.33:229. S.N.161(h). (*C. pedunculata f.* Carr., *Podocarpus koraiana* Hort.) Cult. in Japan. Intr. 1830. Zone VI or VII.—Var. **nàna** Rehd. Shrub spreading by suckers, with upright or ascending stems, to 2 m. tall: fr. subglobose, 2 cm. long, edible. (*C. n.* Nakai.) N. and C. Japan. Intr. 1916. Zone V.—Var. **pedunculàta** Miq. Lvs. to 5 cm. long: male fls. in stalked branched heads, with the stalk 1–2 cm. long. S.Z.2:t.132(c). G.C.III.33:228. S.N.159(h). (*C. p.* Sieb. & Zucc., *C. Harringtonia* K. Koch.) Cult. in Japan. Intr. 1829.—Var. **sinénsis** Rehd. & Wils. Shrub to 4 m.: lvs. linear-lanceolate, tapering to a sharp point. C. and W. China. Intr. 1907.

2. **C. Fórtuni** Hook. Tree to 10 m., usually with several stems; bark reddish brown, peeling off in large flakes leaving pale markings: lvs. spreading nearly horizontally, linear, 5–8 cm. long, glossy green above, with 2 pale bands below, each with about 20 rows of stomata: male fls. in short-stalked heads: fr. ovoid, purple, about 2.5 cm. long. Fl.v; fr.ix. B.M.4499(c). S.N.29(h). C. China. Intr. 1849. Zone VI.—In cult. usually a spreading, rather sparingly branched shrub with long 2-ranked lvs.; at its best a tree with slender spreading brs. pendulous at the ends and forming a broad ovoid head.

Another Chinese species is **C. Olíveri** Mast. It differs chiefly in its rather stiff spreading brs. and in its very close-set rigid and spiny-pointed lvs. truncate at base and about 2.5 cm. long. H.I.1933. G.C.III. 33:226. W. China. Intr. 1900. Zone VI?

4. **TÓRREYA** Arn. Torreya. Trees with fissured bark and whorled brs.; brts. subopposite; winter-buds with few decussate deciduous scales: lvs. distinctly 2-ranked, linear, rigid, pungent, slightly rounded above and lustrous, with 2 rather narrow whitish or brownish bands beneath: fls. dioecious, occasionally monoecious, axillary; staminate fls. ellipsoid to oblong, about 8 mm. long, stalked, consisting of 6–8 whorls of 4 stamens each; female fls. sessile, in pairs of which only one fl. develops: seed ovoid, drupe-like, with a thin fleshy outer coat, ripening the second season; albumen ruminate. (After John Torrey, distinguished American botanist; 1796–1875.) Syn. *Tumion* Raf. Six species in N. Am. and E. Asia.

A. Two-year-old brs. yellowish green.
B. Lvs. about 3 cm. long, with scarcely impressed bands beneath, of fetid odor when bruised.....1. *T. taxifolia*
BB. Lvs. about 2 cm. long, with impressed bands beneath, scarcely fetid.....2. *T. grandis*
AA. Two-year-old brs. reddish brown.
B. Lvs. 2–3 cm. long, linear-lanceolate.....3. *T. nucifera*
BB. Lvs. 3.5–6 cm. long, linear.....4. *T. californica*

1. **T. taxifòlia** Arn. Stinking Cedar. Low Tree, occasionally to 18 m.: lvs. linear, spiny-pointed, rounded at base, 2.5–3.5 cm. long, dark green and lustrous above; anthers truncate at apex: fr. obovoid, 2.5–3 cm. long, purple. Fl.iii; fr.viii. S.S.10:t.512. C.B.3:63. (*Tumion taxifolium* Greene.) Fla. Intr. 1840. Zone VI?—A tree with spreading slightly pendulous brs. forming a rather open pyramidal head.

2. **T. grándis** Fort. Tree to 25 m.: lvs. linear, 1.2–2.3 cm. long, nearly rounded at base, abruptly spiny-pointed, slightly convex above and dark yellow-green; fr. oblong-ellipsoid, 2–3 cm. long; albumen slightly ruminate. (*T. nucifera* var. *g.* Pilger, *Tumion grande* Greene.) C.B.61. D.J.74. E. China. Intr. 1855. Zone VII?

Another Chinese species is **T. Fargèsii** Franch. Lvs. 1.5–2.5 cm. long, more gradually pointed, darker green and rather flat above, with 2 more or less distinct grooves along the midrib: fr. globose-ellipsoid, 2–2.5 cm. long, deeply ruminate, almost to the middle. (*T. grandis* Rehd. & Wils., in part.) C. and W. China. Introd.?

3. **T. nucífera** Sieb. & Zucc. Tree to 25 m.; bark grayish brown, on old trees shallowly fissured and flaking off; brs. wide-spreading: lvs. abruptly narrowed at base and nearly sessile, tapering into a spiny point, dark green and lustrous above, with 2 impressed bands below: anthers cristate-dentate at apex: fr. sessile, ellipsoid-oblong, about 2.5 cm. long, green, faintly tinged with purple; albumen slightly ruminate. Fl.v; fr.ix–x. S.Z.2:t.129(c). S.I.1:t.15(c). W.C.t.3,4(h). (*Tumion nuciferum* Greene.) Japan. Intr. before 1764. Zone V.—A handsome tree with spreading brs. forming a pyramidal or ovoid head and with lustrous dark green lvs.; seeds edible.

4. **T. califórnica** Torr. California Nutmeg. Tree to 20, occasionally to 35 m.; bark gray-brown, fissured into narrow ridges; brs. spreading, slightly pendulous: lvs. tapering to a slender spiny point, dark green above, with 2 narrow deeply impressed glaucous bands below; anthers truncate at apex: fr. ovoid to oblong-ovoid, 2.5–3.5 cm. long, light green, streaked with purple; albumen deeply ruminate. Fl.III–V; fr.VIII–IX. S.S.10:t.513. B.M.4780(c). S.N.294(h). (*T. Myristica* Hook., *Tumion californicum* Greene.) Calif. Intr. 1851. Zone VIII?—A handsome tree with spreading slender brs. and drooping brts. forming a pyramidal head, round-topped in old age.

5. **TAXUS** L. Yew. Trees or shrubs; bark reddish or reddish brown, scaly; brs. usually spreading; brts. irregularly alternate; winter-buds with imbricate scales: lvs. spirally arranged, spreading in 2 ranks, linear, often falcate, with 2 broad yellowish or grayish green bands below, without resin-ducts: fls. axillary, dioecious, rarely monoecious, the staminate forming stalked heads of 6–14 stamens, each with 5–9 pollen-sacs; the female consisting of several imbricate scales, the uppermost bearing an ovule with a disk at base: seed ovoid, slightly angular, surrounded by a scarlet campanulate fleshy cup open at the apex; albumen uniform. (The ancient Latin name of the Yew.) Eight species in the n. hemisphere, very closely related and often considered geographical varieties of one species.

A. Scales of winter-buds obtuse, not keeled.
  B. Lvs. gradually acuminate: bud-scales persistent at base of brts. ..... 1. *T. baccata*
  BB. Lvs. abruptly pointed: bud-scales deciduous ..... 2. *T. chinensis*
AA. Scales of winter-buds acutish or acute, keeled: lvs. abruptly pointed.
  B. Lvs. 2-3 mm. broad, with prominent midrib above: fr. ripening in Oct. . 3. *T. cuspidata*
  BB. Lvs. 1.5–2 mm. broad, with slightly elevated midrib.
    C. Low shrub: seed broader than high ..... 4. *T. canadensis*
    CC. Small tree: seed ovoid ..... 5. *T. brevifolia*

1. **T. baccàta** L. English Y. Tree to 20 m., with broad roundish head, or shrubby; bark reddish, flaky; mature brts. greenish: lvs. abruptly narrowed into a very short greenish petiole, 1–2.5 cm. long, dark green and lustrous above, with 2 pale green bands below: seed broad-ellipsoid, slightly compressed and slightly 2-, rarely 4-angled, about 6 mm. long, olive-brown. Fl.III–IV; fr.IX–X. H.W.1:t.11(c). K.V.131,134(h). Eu., N. Afr., W. Asia. Cult. since ancient times. Zone VI.—A well known ornamental evergreen tree or shrub with numerous garden forms.

Color forms: Var. **variegàta** West. Lvs. with white or whitish variegation. (var. *argentea* Loud.)—Var. **aùrea** Carr. Lvs. yellow. (var. *elvastonensis aurea* Beiss.)—Var. **elegantíssima** Beiss. A vigorous form of dense and compact habit, or occasionally more open; young lvs. striped pale yellow, later whitish. (var. *aurea e.* Hort.)—Var. **semperaùrea** Dallimore. Of rather low growth; the lvs. retaining their yellow color during the second year. (Var. *erecta s.* Beiss.)—Var. **lùtea** Endl. With yellow fr. (Var. *fructu luteo* Hort., f. *luteo-baccata* Pilger.)

Upright forms: Var. **fastigiàta** Loud. Irish Y. Columnar form with crowded upright brs. and brts.: lvs. spirally spreading, not 2-ranked, obtusish, very dark green. Gn.40:62(h). D.H.198(h). (*T. hibernica* Hort.) Intr. 1780.—Variations of this var. are: var. **"fastigiata aùrea"** Standish, with golden-yellow lvs.; var. **"fastigiata variegàta"** Carr. with the lvs. variegated yellowish white.—Var. **erécta** Loud. A bushy upright form: lvs. narrower and shorter than those of var. *fastigiata*, sometimes 2-ranked.

Spreading forms: Var. **Dovastònii** Laws. Dovaston Y. A form with upright stem, horizontal wide-spreading brs. and pendulous brts.: lvs. very

dark, usually falcate. G.C.III.27:147(h). Gn.9:341(h). (Var. *D. pendula* Hort.) Cult. 1800.—Var. **expánsa** Carr. A low bush with rounded top and elongated pendulous brs. in compact layers: lvs. light green, 1–2 cm. long. (Var. *procumbens* Kent, not Loud.)—Var. **repándens** Parsons. A low almost prostrate form with long and wide-spreading brs. and dark bluish green, rather narrow and long lvs. partly falcate and curved upward. B.E.t.11(h).

Var. **adpréssa** Carr. Shrub or low tree with spreading brs.: lvs. oblong, 6–12 mm. long, obtuse and mucronulate: seed usually exceeding the cup. Gn.35:37. S.N.285(h). (*f. tardiva* Pilger, *T. tardiva* Knight, *T. parvifolia* Wender., *T. brevifolia* Hort., not Nutt.) Orig. about 1828 or 1838 in England. —Variations are: var. **"adpressa stricta"** Carr. with upright and ascending brs. forming a columnar bush; and var. **"adpressa aûrea"** Mast. with ascending brs. and yellow lvs.

2. **T. chinénsis** Rehd. Chinese Y. Tree to 15 m. or shrub, with fissured grayish or reddish bark; mature brts. yellowish green; bud-scales deciduous: lvs. distinctly 2-ranked, rather distant, horizontally spreading at nearly right angles from stem, usually falcate, 2–4 cm. long, very short-stalked, dark and lustrous green above and with slightly raised midrib, grayish green below: seed broad-ovoid, slightly 2-angled and slightly compressed; hilum orbicular. Fl.iii–iv; fr. ix–x. C.C.43. S.N.35(h). (*T. baccata* var. *c.* Pilger, *T. cuspidata* var. *c.* Rehd. & Wils.) C. and W. China. Intr. 1908. Zone (V).

3. **T. cuspidàta** Sieb. & Zucc. Japanese Y. Tree to 16 m., with reddish brown bark and spreading or upright-spreading brs.; mature brts. reddish brown; bud-scales generally ovate, the basal ones usually triangular-ovate: lvs. irregularly 2-ranked, the ranks more or less upright and forming a V-shaped trough, 1.5–2.5 cm. long, abruptly contracted into a distinct yellowish stalk, dark and rather dull green above, with 2 tawny-yellow bands below about twice as broad as the green margin: seed ovoid, compressed, slightly 3–4-angled; hilum elliptic. Fl.iii–iv; fr.x–xi. S.Z.2:t.62(c). S.I.1:t.15(c). W.C.t.5(h). Gn.M.30:214,215(h). (*T. baccata* var. *c.* Carr., *T. Sieboldii* Hort.) Japan, Korea, Manch. Intr. 1855. Zone V.—A very valuable evergreen on account of its hardiness and dense dark green foliage.—Var. **nàna** Rehd. Low shrub, occasionally to 2 m. high or more, with wide-spreading brs. densely clothed with short brts., rather dense and compact while young: lvs. rather short, duller and more upright, not or slightly 2-ranked. B.E.t.10 (h). Gn.M.30:214(h). (Var. *brevifolia* Hort., var. *compacta* Bean.)—Var. **dénsa** Rehd. Dwarf compact shrub with upright and ascending brts. forming a dense broad-conical or rounded bush, scarcely exceeding 1/2 m. H.D. 165,t(h).—Var. **auréscens** Rehd. Low compact form with the young lvs. yellow changing later to green. (*T. tardiva aurea* Hort.)

T. c. × *baccata* = **T. mèdia** Rehd. Intermediate between the parents. Older brts. olive-green, often reddish above; bud-scales obtuse, slightly keeled: lvs. similar to those of *T. cuspidata*, but more distinctly 2-ranked and often horizontally spreading. H.B.3:30(h). Orig. about 1900. Zone V.—Var. **Hatfièldii** Rehd. Compact conical bush with upright brs. and radially spreading lvs. Gn.M.33:25(h). H.B. 3:21(h).—Var. **Hícksii** Rehd. Columnar form with upright brs. and radially spreading lvs. (*T. cuspidata H.* Hort.) Similar to the Irish Y., but hardier.

T. c. × *canadensis* = **T. Hunnewelliàna** Rehd. Resembling *T. cuspidata*, but of slenderer habit and with slenderer and narrower lvs. partly pointing forward, the green margin beneath more than 1/2 as broad as the stomatic band, lighter green and assuming mostly a reddish tint in winter. Orig. about 1900.

4. **T. canadénsis** Marsh. Canada Y. Low shrub, often straggling, or with ascending brs. and occasionally 1–2 m. tall; mature brts. green, older reddish brown; bud-scales more or less lanceolate: lvs. abruptly narrowed into a

fine point, 1.3–2 cm. long, very short-stalked, dark yellow-green above, with pale green bands below not much broader than the green margin, often indistinctly 2-ranked, assuming a reddish tint in winter. Fl.IV; fr.VII. B.B.1:67. Gn.M.2:11(h). (*T. baccata* var. *c.* Gray, *T. baccata* var. *procumbens* Loud., *T. minor* Brit.—Ground Hemlock.) Nfd. to Va., Iowa and Man. Intr. about 1800. Zone II.—The hardiest of the Yews, but less handsome than the other species.

5. **T. brevifòlia** Nutt. WESTERN Y. Tree to 15, rarely to 25 m., usually with horizontally spreading brs. and slightly pendulous brts.; bark reddish brown; mature brts. yellowish green, older greenish or light brown; bud-scales usually cuspidate or mucronate: lvs. distinctly 2-ranked and horizontally spreading, 1–2 cm. long, abruptly and sharply pointed, contracted into a slender yellow petiole, the green margin below nearly as broad as the stomatic band: seed ovoid, 2–4-angled. Fl.VI; fr.VIII–X. S.S.10:514. (*T. baccata* var. *b.* Koehne.) B. C. to Calif. and Mont. Intr. 1854. Zone V or VI.—Handsome, but rare in cult.

3. PINACEAE Lindl. PINE FAMILY

Resinous trees, rarely shrubs, secondary wood without true vessels: lvs. linear, rarely lanceolate, or scale-like, alternate or opposite, sometimes whorled, evergreen, rarely deciduous: fls. usually monoecious (dioecious in Juniperus), cone-like, rarely berry-like; staminate fls. consisting of many scales bearing on the under side 2–6, rarely more, 2-, rarely 3–5-celled anthers; pistillate fls. with few to numerous scales, each with 1 or 2, rarely more ovules on the upper side: fr. a more or less woody cone with usually winged seeds, or berry-like with fleshy coalescent scales enclosing the terete or angular seeds; embryo with 2–15 cotyledons.—Thirty genera distributed through both hemispheres chiefly in the temperate and subtropical regions.

A. Lvs. opposite or whorled, small and usually scale-like: cone with few scales; ovules erect; cotyledons usually 2 ..... Subfam. 1. CUPRESSINEAE
B. Fr. berry-like, consisting of 2–6 fleshy connate scales enclosing the 1–12 seeds: lvs. opposite or ternate, scale- or needle-shaped ..... 1. *Juniperus*
BB. Fr. a woody dehiscent cone.
C. Lvs. opposite, scale-like (needle-shaped in the juvenile state and in some garden forms); cone-scales opposite.
D. Cone-scales peltate; cone subglobose.
E. Each cone-scale with many seeds; cone rather large, usually ripening the second year: brts. terete or quadrangular, rarely flattened ..... 2. *Cupressus*
EE. Each cone-scale with 2 seeds, rarely 3–5; cone small, ripening the first year: brts. flattened ..... 3. *Chamaecyparis*
DD. Cone-scales flattened, imbricate: cone ovoid or oblong-ovoid.
E. Each cone-scale with 3–5 seeds: brts. much flattened, 5–6 mm. broad, with conspicuous glaucous patches beneath ..... 4. *Thujopsis*
EE. Each cone-scale with 2 seeds: brts. rather narrow, with or without whitish markings beneath.
F. Pairs of cone-scales 4, the upper pair fertile ..... 5. *Libocedrus*
FF. Pairs of cone-scales 6–8, the 2 upper pairs fertile ..... 6. *Thuja*
CC. Lvs. ternate, linear: cone-scales ternate, valvate, only 1 whorl fertile ..... 7. *Fitzroya*
AA. Lvs. and cone-scales spirally arranged, the former sometimes fascicled; ovules inverted.
B. Cone-scales without distinct bracts, flat or peltate, with 1–9 seeds.
C. Carpels with 2–9 ovules and with a bract coalescing with the scale: lvs. narrow: cotyledons 3–9 ..... Subfam. II. TAXODINEAE
D. Lvs. solitary, scattered.
E. Cone-scales peltate: lvs. heteromorphic, linear or scale-like.
F. Cone subglobose or obovoid; scales with 2 seeds: lateral brts. deciduous. 8. *Taxodium*
FF. Cone oblong-ovoid; scales with 4–9 seeds: all brts. persistent ..... 9. *Sequoia*
EE. Cone-scales flattened, with 3–5 seeds: lvs. homomorphic.
F. Lvs. awl-shaped, curved: cone-scales with an upright toothed crest above the seeds ..... 10. *Cryptomeria*
FF. Lvs. lanceolate, flat, glaucous below: cone-scale with a narrow serrulate line above the seeds ..... 11. *Cunninghamia*
DD. Lvs. connate into pairs 8–15 cm. long, in whorls of 15–25 at the end of the shoots: cone-scales thick and woody, with 7–9 seeds ..... 12. *Sciadopitys*

cc. Carpels with 1 ovule, simple: lvs. ovate-lanceolate, densely imbricate, 8–20 cm. broad at base: cones large: cotyledons 2–4 ..... Subfam. III. ARAUCARINEAE
13. *Araucaria*

bb. Cone-scales and bracts distinct; scales with 2 usually winged seeds: lvs. linear: winter-buds distinct, with scarious scales ..... Subfam. IV. ABIETINEAE

c. Lvs. solitary.

d. Cone upright.

e. Cone-scales persistent: lvs. flattened, keeled above, pale green below.
14. *Keteleeria*

ee. Cone-scales deciduous from their axis: lvs. flattened, grooved above, usually with glaucous bands below, rarely 4-angled ..... 15. *Abies*

dd. Cone reflexed or pendulous; scales persistent.

e. Bracts exserted, conspicuous: brts. not roughened by lf.-bases: winter-buds elongated, pointed, not resinous ..... 16. *Pseudotsuga*

ee. Bracts not exserted: brts. roughened by persistent lf.-bases.

f. Lvs. usually flattened and stomatiferous below, 4-angled, with 1 resin-duct below the fibro-vascular bundle ..... 17. *Tsuga*

ff. Lvs. usually quadrangular, or flattened and with stomatic bands above; resin-ducts lateral ..... 18. *Picea*

cc. Lvs. in fascicles or clusters of 2 or more, solitary only on shoots.

d. Lvs. many, clustered on short thick spurs: cone-scales flat at apex.

e. Lvs. deciduous.

f. Bud-scales obtuse: staminate fls. solitary: cone-scales persistent .... 19. *Larix*

ff. Bud-scales acuminate: staminate fls. clustered: cone-scales deciduous.
20. *Pseudolarix*

ee. Lvs. evergreen: cone ripening the 2d or 3d season, 5–12 cm. long .... 21. *Cedrus*

dd. Lvs. in fascicles of 2–5, rarely to 8, sometimes reduced to 1, sheathed at base by scarious bud-scales: cone-scales usually much thickened at apex, persistent.
22. *Pinus*

1. **JUNÍPERUS** L. JUNIPER. Trees or shrubs with usually thin, shreddy, rarely scaly bark: lvs. opposite or ternate, acicular or scale-like, on young plants always acicular, on old plants either all acicular and ternate, or all scale-like or both: fls. dioecious or monoecious, axillary or terminal, the staminate yellow, consisting of numerous opposite or ternate stamens forming an ovoid or oblong catkin, the female of 3–8 pointed scales, some or all bearing 1 or 2 ovules; the scales become fleshy and unite into a berry-like indehiscent and usually succulent strobile subtended by scaly bracts, ripening the first, 2d or 3d year; seeds 1–12 usually ovoid, terete or angled, often grooved, brown, with a conspicuous hilum at base: cotyledons 2 or 4–6. (The ancient Latin name.) Including *Sabina* Spach. About 40 species widely distributed through the n. hemisphere from the arctic zone to the mts. of the tropics.

a. Lvs. all acicular, ternate, spreading, jointed at base, with 2 white, often confluent bands above: winter-buds distinct: fls. axillary, dioecious: seeds usually 3.

b. Fr. large, 2–2.5 cm. across; seeds connate into a 3-celled stone: lvs. decurrent, 3–4 mm. broad ..... Sect. I. CARYOCEDRUS Endl.
1. *J. drupacea*

bb. Fr. smaller; seeds not connate: lvs. 1.5–3 mm. broad, not decurrent.
Sect. II. OXYCEDRUS Endl.

c. Lvs. with the white band above separated by a green midrib.

d. White bands scarcely as broad as the green margin; lvs. spreading, sharply pointed: brts. spreading.

e. Lvs. very rigid, 1.2–2 cm. long, tapering from the middle ..... 2. *J. Oxycedrus*

ee. Lvs. less rigid, 2–2.5 cm. long, tapering from the base ..... 3. *J. macrocarpa*

dd. White bands broader than the green margin; lvs. directed forward: tree with pendulous brs ..... 4. *J. formosana*

cc. Lvs. with the white bands confluent.

d. White band narrower than the green margin; lvs. sulcate above.

e. Upright shrub or tree: fr. 6–8 mm. across ..... 5. *J. rigida*

ee. Procumbent shrub: fr. 8–12 mm. across ..... 6. *J. conferta*

dd. White band broader than the green margin; lvs. concave above ... 7. *J. communis*

aa. Lvs. all or partly scale-like, less often all acicular, but not jointed at base, decurrent; without distinct winter-buds: fls. terminal, dioecious or monoecious: fr. with 1–6 seeds.
Sect. III. SABINA Endl.

b. Lvs. always ternate and acicular: seed 1.

c. Brs. recurved and pendulous; tree: lvs. loosely appressed, channeled on the back near the base, without green midrib above ..... 8. *J. recurva*

cc. Brs. prostrate or spreading; shrubs or tree: lvs. appressed or spreading, with a green midrib above, channeled from base to near apex.

D. Brts. green and lvs. green below: procumbent shrub or tree: fr. 1-seeded. 9. *J. squamata*
DD. Brts. glaucous on the edges of the pulvini: lvs. glaucous beneath spotted with white: procumbent shrub: fr. 2–3-seeded ..... 10. *J. procumbens*
BB. Lvs. at least on mature plants wholly or partly scale-like, usually opposite or opposite and ternate on the same plant.
C. Lvs. minutely denticulate (under a strong lens).
D. Acicular lvs. usually ternate.
E. Fr. reddish brown or yellow, rather large, fibrous, dry.
F. Scale-like lvs. obtuse or obtusish, opposite: seeds 3–6.
G. Bark shreddy: fr. shining yellow ..... 11. *J. phoenicea*
GG. Bark scaly: fr. reddish brown, bloomy ..... 12. *J. pachyphloea*
FF. Scale-like lvs. acute: seed 1 ..... 13. *J. utahensis*
EE. Fr. blue or blue-black, usually bloomy, juicy.
F. Brts. stout; scale-like lvs. usually ternate, conspicuously glandular: seeds 2–3 ..... 14. *J. occidentalis*
FF. Brts. slender; scale-like lvs. opposite, rarely ternate, glandless or obscurely glandular: seed usually 1.
G. Fr. globose or ellipsoid, bloomy, 3–6 mm. long ..... 15. *J. monosperma*
GG. Fr. ovoid, broadest at base, not bloomy, 6–12 mm. long. 16. *J. Wallichiana*
DD. Acicular lvs. opposite; scale-like lvs. acute: fr. blue; seeds 2–4 .... 17. *J. thurifera*
CC. Lvs. entire: fr. blue-black, small, (brown or purplish brown and larger in no. 18 and 19).
D. Acicular lvs. often ternate; scale-like lvs. obtuse: fr. brown, bloomy, seeds 2–3. 19. *J. chinensis*
DD. Acicular lvs. opposite, ternate only on leading shoots: scale-like lvs. acute.
E. Fr. dark purplish brown, about 1 cm. across, with about 6 seeds: acicular lvs. rarely present on adult trees ..... 18. *J. excelsa*
EE. Fr. blue-black, 5–6 mm. across, with 1–4 seeds.
F. Fr. erect or nodding; seeds 1–2; trees, rarely shrubby.
G. Fr. ripening the first season: male fls. with 10–12 stamens. 20. *J. virginiana*
GG. Fr. ripening the second season: male fls. with 6 stamens. 21. *J. scopulorum*
FF. Fr. pendulous; seeds 1–4, usually 2: shrubs, often prostrate.
G. Lvs. dark green, obtuse or acutish, of strong disagreeable odor when bruised ..... 22. *J. Sabina*
GG. Lvs. bluish green or steel-blue, acute or cuspidate, of aromatic, less strong odor: prostrate shrub ..... 23. *J. horizontalis*

1. **J. drupàcea** Labill. Syrian J. Tree to 20 m., of pyramidal habit, in cult. usually columnar; brts. triangular, with prominent ridges: lvs. linear-lanceolate, widest near base, sharply pointed, above with 2 white bands and a broad green midrib, 1.5–2 cm. long: fr. brown or bluish, bloomy, ripening the 2d season. G.C.III.19:519. B.C.3:14. S.N.114,205(h). Greece, Asia Minor. Intr. 1853. Zone VII–VIII?—Handsome ornamental tree of columnar habit; thrives well on limestone soil.

2. **J. Oxycédrus** L. Prickly J. Shrub or small tree to 10 m.: brts. angular, rather slender: lvs. linear, tapering from the middle to a spiny point, 12-18 mm. long and 1–1.5 mm. broad: fr. globose, 6–12 mm. across, reddish brown, without or with partial bloom. H.W.1:193. C.B.3:22. Medit. Reg. to Cauc. and Persia. Cult. 1740. Zone VIII?—In cult. usually a compact shrub.

3. **J. macrocárpa** Sibth. Plum J. Bushy shrub or small tree to 4 m., of dense pyramidal habit: lvs. linear, tapering from the base, sharply pointed, 1.8–2.5 cm. long, 2 mm. broad: fr. globose, 1.2 cm. across, dark brown, glaucous. C.B.3:16. (*J. neaboriensis* Gord., *J. Oxycedrus* subsp. *m.* Aschers. & Graebn.) Medit. Reg. Intr. 1838. Zone VIII.

4. **J. formosàna** Hayata. Formosan J. Tree to 12 m., usually dividing into several stems from near the base, with spreading or ascending brs. and pendulous brts.: lvs. more or less directed forward, linear, spiny-pointed, 1.2–2.5 cm. long and 1.5–2 mm. wide, with two broad white bands above coalescent near apex, keeled below: fr. subglobose or broadly ovoid, 8 mm. across, reddish or orange brown. J.C.25,19:t.38. C.B.3:17. S.N.31(h). (*J. taxifolia* Parl., not Hook. & Arn., *J. oblonga pendula* Knight & Perry.) Formosa, China. Intr. probably 1844. Zone V.—Handsome tree with pendulous brts.

5. **J. rígida** Sieb. & Zucc. NEEDLE J. Shrub or tree to 10 m., pyramidal or columnar, with ascending brs. and pendulous brts.: young brts. slender, triangular: lvs. spreading, linear-subulate, tapering from the middle into a spiny point, 1.2–2.5 cm. long, about 1 mm. wide, deeply sulcate above and with a narrow white band, prominently keeled below: fr. globose, 6–8 mm. across, brownish black, bloomy, finally slightly shining, ripening the second year. S.I.1:t.12(c). W.C.58(h). Japan, Korea, to N. China. Intr. 1861. Zone V.—Graceful pyramidal tree or shrub with pendulous brts.

6. **J. conférta** Parl. Procumbent shrub: lvs. crowded, about 1.2 cm. long, bluish green, tapering to a spiny point, deeply sulcate above, keeled below: fr. globose 8–12 mm. across, black and bloomy. C.B.3:18. W.C.t.59(h). Gn.88:142(h). (*J. litoralis* Maxim.) Saghal., Japan. Intr. 1915 to Am. Zone (V).

7. **J. commùnis** L. COMMON J. Shrub or tree of pyramidal habit, to 12 m.; bark reddish brown, peeling off in papery shreds: lvs. linear-subulate to linear-lanceolate, tapering from the base to a spiny point, about 1.5 cm. long, concave above and with a broad white band sometimes divided at base by a green midrib, bluntly keeled below: fls. rarely monoecious: fr. globose or broadly ovoid, 5–6 mm. across, short-stalked, bluish or black, slightly bloomy, ripening the 2d or 3d year; seeds usually 3. H.W.1:t.10(c). S.S.1:t.516. E.H.6:t.348(h). N. Am., s. to Pa., Ill., N. M. and n. Calif.; Eu. to W. Himal. and n.e. Asia. Cult. before 1560. Zone I.—A very variable species with some garden forms and several geographical varieties.—Var. **aùrea** Nichols. Young growth golden yellow, changing later to green. (var. *aureo-variegata* Beiss.)—Var. **suècica** Ait. SWEDISH J. Columnar form with rather spreading, light bluish green lvs.; brts. with nodding tips. B.N.621(h). G.W.20:579(h). (Var. *fastigiata* Parl., *J. s.* Mill.)—Var. **hibérnica** Gord. IRISH J. Similar to the preceding, but lvs. shorter, less spreading, dark green; tips of brts. upright. B.N.623(h). (Var. *stricta* Carr.)—Var. **péndula** Carr. Shrub with spreading and recurving brs. and pendulous brts.—Var. **oblóngo-péndula** Sudw. Broad-columnar shrub with pendulous brts. and thin and slender lvs. (Var. *oblonga pendula* Loud.)—Var. **compréssa** Carr. Slow growing dwarf fastigiate shrub with very short crowded brts. and thin lvs. 3–6 mm. long. H.D.70,t(h).

The following are geographical varieties: Var. **depréssa** Pursh. PROSTRATE J. Low Shrub, rarely exceeding 1.5 m., forming broad patches with numerous stems ascending from a procumbent base: lvs. somewhat shorter and broader. B.E.t.12(h). (Var. *canadensis* Loud., var. *nana canadensis* Carr., *J. canadensis* Burgsd.) E. N. Am.—A variation with the young growth yellow is var. **aùreo-spìca** Rehd. (*J. nana canadensis aurea* Beiss., *J. canadensis aurea* Hort.)—Var. **montàna** Ait. MOUNTAIN J. Spreading prostrate shrub, rarely over 60 cm. high: lvs. crowded, linear-oblong, 4–8 mm. long and 1–2 mm. broad, abruptly pointed, usually curved and very concave above: fr. globose, 5 mm. across, glaucous; seeds 1–3. E.B.8:t.1383(c). M.G.25:123(h). (Var. *nana* Loud., var. *alpina* Gaud., *J. m.* Willd., *J. sibirica* Burgsd.) Arctic reg. and high mts. of Eu. and N. Am. Cult. 1789.—Var. **Jáckii** Rehd. Prostrate shrub with flagelliform trailing brs. often to 1 m. long and nearly unbranched except a few clusters of short brts.: lvs. linear-lanceolate, incurved. Ore., n. Calif. Intr. 1904.—Var. **nippónica** Wils. Similar to var. *montana*, but lvs. deeply sulcate above and keeled below. High mts. of Japan. Intr. 1915.

8. **J. recúrva** Buch.-Ham. Tree to 10 m., usually broad-pyramidal with

spreading curved brs. and pendulous brts.: bark brown, peeling off in thin flakes: lvs. ternate, densely imbricated and loosely appressed, linear-lanceolate, 3–6 mm. long, sharply pointed, very concave above and whitish, dull green beneath and grooved below the middle: fls. monoecious: fr. ovoid, 8–10 mm. long, dark purple-brown, ripening the 2d year, 1-seeded. G.C.II. 19:574. B.S.1:674,t(h). (*Sabina r.* Ant.) Himal.: Sikkim and Bhutan.; S. W. China. Intr. 1830. Zone VIII?—A graceful tree with dull foliage.

9. **J. squamàta** Buch.-Ham. Shrub with long decumbent brs. and ascending brts.; young brts. green: lvs. ternate, crowded and loosely appressed or slightly spreading, linear, finely pointed, 3–4 mm. long, concave above and whitened, convex below and grooved from base to near apex, green: fr. ellipsoid, 6–8 mm. long, changing from reddish brown to purplish black, 1-seeded. C.B.3:29. S.N.192(h). (*J. recurva* var. *s.* Parl., *J. densa* Gord., *Sabina s.* Ant.) Himal., W. and C. China, Formosa. Intr. 1836 or before. Zone V.—Var. **prostràta** Hornibrook. Prostrate form with horizontally spreading brs. Intr. 1909.—Var. **Fargèsii** Rehd. & Wils. Tree 5–20 m., with upright-spreading brs.: lvs. narrower and longer, usually 8 mm. long, acuminate, pale or bluish green: fr. ovoid, 5–6 mm. long. S.N.193(h). Gn.88:141 (h). (*J. F.* Komar.) W. China. Intr. 1907 to Am.—Var. **Wilsònii** Rehd. Upright shrub to 2 m., with short crowded brts. recurved at the tips: lvs. shorter and broader, crowded, broad-lanceolate, about 4 mm. long. W. China. Intr. 1909 to Am.—Var. **Meÿeri** Rehd. Upright much branched shrub with ascending brs. and short straight brts.: lvs. narrow-lanceolate, straight, 6–8 mm. long, very glaucous on back. B.D.1923:t.20(h). H.B.1:76 (h). China. Intr. to Am. in 1914. Zone V. Very handsome on account of its dense habit and bluish white foliage.

10. **J. procúmbens** Sieb. Low spreading shrub, with stiff, ascending brts., about 50 cm. high; brts. glaucous: lvs. ternate, linear-lanceolate, 6–8 mm. long, spiny-pointed, concave above and glaucous with a green midrib, bluish below, with 2 white spots near the base from which 2 glaucous lines run down the edges of the pulvini: fr. subglobose, 8–9 mm. across, 2–3-seeded. S.Z.2: t.127,f.3. C.B.3:25. (*J. chinensis* var. *p.* Endl.) Cult. in Japan. Intr. 1843. Zone V.—Handsome low shrub, often planted as a ground-cover, particularly in Calif.

11. **J. phoenícea** L. Phoenician J. Shrub or tree to 6 m., with upright or ascending brs. forming a pyramidal head: lvs. usually scale-like, in 3's or opposite, rhombic-ovate, 1 mm. long, obtuse, rounded on the back, dark or bluish green: fls. usually monoecious: fr. variable, but usually globose, 8 mm. across, shining yellow or reddish brown, 3–6-seeded. B.S.1:673. C.B. 3:13. (*Sabina p.* Ant.) Mediter. Reg. Intr. 1683. Zone VIII.

12. **J. pachyphlœa** Torr. Alligator J. Tree to 20 m., with a short trunk and stout spreading brs. forming a broad-pyramidal or round-topped head; bark dark brown, broken into small, closely appressed scales; brts. slender: lvs. usually scale-like, opposite, bluish green, rhombic-ovate, 1.5 mm. long, rounded or apiculate at the apex, obscurely keeled on the back and glandular; acicular lvs. 3–6 mm. long, spiny-pointed, in 3's or in pairs, usually bluish green: fr. globose or broadly ellipsoid, 1.2 cm. long, tuberculate, reddish brown, bloomy, ripening the second year, usually 4-seeded. S.S.10:t.520. C.B.3:23. M.D.1921:t.17(h). For. & Irr. 12:150(b). (*Sabina p.* Ant.). Ariz. and New Mex. to s.w. Tex. and Mex. Cult. 1873. Zone VII or VIII.—One of the handsomest American Junipers, remarkable for its checkered bark; the acicular foliage of young plants is usually glaucous or nearly silvery

white. Some named juvenile forms have been offered in Eu., e.g., var. **ericoïdes** Barbier, with glaucous lvs. R.H.1914:343.

13. **J. utahénsis** Lemm. Utah J. Bushy tree, rarely exceeding 6 m., with short trunk and erect or ascending brs. forming a roundish open head; bark shreddy; brts. slender: lvs. usually scale-like, opposite or occasionally in 3's, rhombic-ovate, acute or often acuminate, about 2 mm. long, rounded on the back and usually glandless; acicular lvs. usually in 3's: fr. subglobose or broadly ellipsoid, 4–6 mm. long, marked by the tips of the scales, reddish brown, bloomy, 1- or rarely 2-seeded. S.S.10:t.518. Contr. U. S. Nat. Herb. 25:t.13(h). (*J. californica* var. *u.* Engelm., *Sabina u.* Rydb.) Wyo. to Calif., Ariz. and New Mex. Intr. about 1900. Zone VII or VIII.—Little known in cult. and of no particular ornamental value.—Var. **megalocárpa** Sarg. Tree to 18 m., with a single tall trunk; scale-like lvs. in 3's: fr. 1.2–1.5 cm. across. For. & Irr. 13:307(h). (*J. m.* Sudw.) Ariz., N. Mex. Intr. 1916.

A related species is **J. Pinchôtii** Sudw. Shrubby tree to 6 m: lvs. usually in 3's, acute, about 2.5 mm. long, conspicuously glandular-pitted: fr. subglobose, 6–9 mm. long, reddish-brown, with 1–2 seeds. For. & Irr.11:203(h), 204. Texas. Introd.?

14. **J. occidentàlis** Hook. Tree to 15, rarely to 20 m., with short trunk and spreading brs. forming a low broad head, or a shrub with several stems; brts. stout, about 2 mm. thick: lvs. usually scale-like, in 3's, closely appressed, rhombic-ovate, acute or acuminate, about 3 mm. long, grayish green, glandular: fr. subglobose or ellipsoid, 6–8 mm. long, bluish black, bloomy, 2–3-seeded. S.S.10:t.521. C.B.3:21. S.N.191(h). (*Sabina o.* Rydb.) Wash. to s. Calif. Intr. 1840. Zone VIII.

15. **J. monospérma** Sarg. Tree, occasionally to 18 m., with short stout brs. forming an irregular head, or branching from the base and shrubby: brts. slender, about 1 mm. thick: lvs. mostly scale-like, opposite, rarely in 3's, acute or acuminate, often slightly spreading at the apex, 2 mm. long, rounded on the back and conspicuously glandular, grayish green; acicular lvs. in 3's, often 1 cm. long: fr. globose or ovoid, 3–6 mm. long, dark blue, bloomy, 1-seeded, rarely 2–3-seeded; seeds sometimes more or less exserted (*gymnocarpa* Rehd.). S.S.10:t.522. (*J. occidentalis* var. *m.* Engelm., *Sabina m.* Rydb.) Colo. to w. Tex., n. Mex. and Nev. Intr. about 1900. Zone VII or VIII.—Of little ornamental value.

16. **J. Wallichiàna** Hook. f. Tree to 20 m. with spreading brs., or shrub; brts. slender: lvs. usually of 2 kinds; the scale-like lvs. opposite, closely appressed, narrowly ovate, acute, 1.5 mm. long, bright green, furrowed and glandular on the back; the acicular lvs. in 3's, whitened above, 4 mm. long: fls. dioecious: fr. erect, at the end of short curved brts., ovoid, 1 cm. long, dark, purplish brown, finally blue, 1-seeded. C.B.3:32. (*J. Pseudosabina* Hook. f., not Fisch. & Mey.) Himal., S. W. China. Intr. 1849. Zone VIII.—Little known in cult.

The following two closely related species are also little known: **J. pseudosabìna** Fisch. & Mey. Low shrub with less acute lvs. and smaller recurved, often globose fr. Altai Mts., Turkest. Cult. 1900. Zone V or VI?—**J. saltuària** Rehd. & Wils. Tree to 15 m.: lvs. acute or obtusish, obscurely glandular: fls. monoecious: fr. ovoid or subglobose, 5–6 mm. long, black. N.W. China. Intr. 1904. Zone VI or VII?

17. **J. thurífera** L. Tree to 12 m., narrow-pyramidal in cult.; brt.-systems pinnately divided and mostly in one plane: brts. slender: lvs. often of 2 kinds, always opposite, the scale-like ovate, free at the acuminate apex, 1.5 mm. long, with a glandular depression on the back; the acicular lvs. 3–4 mm. long,

glaucous above with a green midrib: fls. dioecious: fr. subglobose, about 8 mm. across, dark blue, slightly bloomy; seeds 2–4. C.B.3:11,4. (*J. hispanica* Mill., *J. sabinoides* Endl., partly, *Sabina t.* Ant.) S.W. Eu., N. Afr. Intr. before 1750. Zone VIII?

18. **J. excélsa** Bieb. Tree to 20 m., with upright or spreading brs., forming a narrow-pyramidal head: bark brown, peeling off in strips: brts. very slender; lvs. usually scale-like, opposite, rhombic-ovate, closely appressed, with incurved acute apex, glandular on back, on the leading shoots ternate; acicular lvs. opposite, 5–6 mm. long, with 2 glaucous bands above; fr. globose, about 8 mm. across, dark purplish brown, covered with bluish bloom, 4–6-seeded. Gt.46:t.26. C.B.2:75. S.N.78(h). (*Sabina e.* Ant.) S.W. Eu., Asia Minor, Cauc. Intr. 1836. Zone VIII.—Var. **stricta** Rollisson. Columnar form with juvenile glaucous foliage. (var. *Perkinsii* Gord., var. *venusta* Gord.).

19. **J. chinénsis** L. Chinese J. Tree to 20 m., usually with ascending brs. forming a pyramidal head, or shrub, sometimes procumbent; brts. slender: lvs. often of 2 kinds, the scale-like narrowly rhombic, closely appressed, obtuse, 1.5 mm. long, the acicular ones usually ternate, spiny pointed, with 2 white bands above: fls. dioecious, the staminate yellow, with about 8 pairs of stamens, often on brs. with juvenile foliage: fr. subglobose, 6–8 mm. across, brown with a thick mealy bloom, ripening the second year; seeds 2–3. S.Z.2:t.126,127(c). S.I.1:t.12(c). B.N. 603(h). (*Sabina c.* Ant.) China, Mong., Japan. Intr. before 1767. Zone IV.—A variable species with many garden forms.—Var. **variegàta** Fort. Compact shrub with the tips of the brts. creamy white: lvs. mostly scale-like. G.M.6:292. (Var. *albo-variegata* Veitch.)—Var. **aûrea** Young. Upright form with scale-like lvs., the young growth golden yellow. (Var. *mascula aurea* Hort.)

Columnar or narrow-pyramidal forms: Var. **mas** Gord. Dense columnar form with mostly acicular lvs. and usually with staminate fls. Handelsbl. Deutsch. Gartenb. 26:315(h). (Var. *mascula* Carr. Var. *neaboriensis* Beiss., Var. *neoboracensis* Spaeth, *J. struthiacea* Knight.)—Var. **pyramidàlis** Beiss. Very compact narrow-pyramidal form with upright brs. and crowded upright brts.: lvs. nearly always acicular and ternate, 4–10 mm. long, stiff and glaucous. (*J. japonica p.* Carr.)

Spreading and pendulous forms: Var. **Pfitzeriàna** Spaeth. Broad-pyramidal form or often without leader and spreading, with wide-spreading brs. and nodding brts. and grayish green or glaucous scale-like lvs. B.N.606(h). B.E.t.13(h).—Var. **péndula** Franch. With spreading brs. and pendulous brts.

Low or dwarf forms: Var. **globòsa** Hornibrook. Dwarf and dense subglobose form with short crowded thickish brts. clothed mostly with scale-like bright green lvs. (*J. virginalis g.* Hort.) A form with the younger brts. variegated with golden yellow is var. **aureo-globosa** Rehd.—Var. **plumòsa** Hornibrook. Low plant with spreading and arching brs. and short nodding brts. clothed with mostly scale-like lvs., forming plumose sprays. (Var. *procumbens* Beiss., in part.) A form with the young foliage golden yellow is var. **"plumosa aurea"** Hornibrook (var. *japonica aurea* Mast., *J. japonica aurea* Carr.)—Var. **japónica** Lav. Low shrub with decumbent brs. and mostly with acicular lvs. (Var. *nana* Hochst., var. *procumbens* Beiss., in part, var. *decumbens* Hornibrook, *J. j.* Carr.) A form with the foliage variegated with white is var. **alba** Rehd. (*J. japonica a.* Standish, *J. chinensis* var. *procumbens albo-variegata* Beiss.) A form variegated with yellow is var.

"japonica aureo-variegata" Mast. (*J. j. a.* Hort.)—Var. **Sargénti** Henry. Prostrate shrub with creeping stems and ascending brts. forming dense mats; adult plants with the lvs. scale-like and bluish green, on young plants acicular and grass-green: fr. bluish, slightly bloomy. W.A.98,t(h). B.E.t.14(h). (Var. *procumbens* Takeda, *J. procumbens* Sarg., not Sieb.) Japan, Saghal., Kurile Isls. Intr. 1892 to Am. A handsome form valuable as a ground-cover.

The plant now in cult. as *J. sphaerica* Lindl. does not differ from *J. chinensis*.

20. **J. virginiàna** L. Red Cedar. Tree to 30 m., with upright or spreading brs. forming a narrow- or broad-pyramidal head; bark reddish brown, shredding in long strips; brts. very slender, less than 1 mm. thick; scale-like lvs. rhombic-ovate, acute or acuminate and free at apex, 1.5 mm. long, often with a small gland on back, acicular lvs. often present, 5–6 mm. long, spiny-pointed, concave and glaucous above, opposite, but on vigorous shoots and on young plants in 3's: staminate fls. with about 6 pairs of stamens: fr. subglobose or ovoid, 6 mm. long, bluish, bloomy, ripening the first season; seeds 1–2. S.S.10:t.524. G.F.8:65(h);10:145(h). (*Sabina v.* Ant.) Canada to Fla., east of the Rocky Mts. Intr. before 1664. Zone I.—A variable species of which many garden forms are in cult.—Var. **albo-spìca** Beiss. Tips of brts. white; here belongs "Triomphe d'Angers" with the variegation more constant and more conspicuous.—Var. **variegàta** Laws. Brts. variegated with white. (Var. *albo-variegata* Beiss.)—Var. **glaùca** Carr. Pyramidal form with very glaucous lvs. S.N.189(h). B.E.t.15(h).—Var. **elegantíssima** Hochst. Pyramidal tree with the tips of the brts. golden-yellow.—Var. **plumòsa** Rehd. Pyramidal form with mostly acicular lvs. and white tips. S.N.64(h). (Var. *plumosa alba* Beiss.)

Columnar and narrow-pyramidal forms: Var. **pyramidàlis** Carr. Dense columnar form. S.N.104(h). B.E.t.3(h).—Var. **venústa** Rehd. A columnar form with glossy dark green lvs. (*J. v.* Ellw. & Barry.)—Var. **pyramidifórmis** D. Hill. Pyramidal form with the lvs. bright green in summer, soft-purple in autumn and winter.—Var. **Schóttii** Gord. Narrow-pyramidal form with bright green scale-like lvs.—Var. **Canaèrtii** Sénécl. A compact pyramidal form with dark green lvs. and bluish bloomy frs. usually profusely produced. (Var. *Cannartii* Beiss.)

Spreading or pendulous forms: Var. **péndula** Carr. With spreading brs. and slender pendulous brts.: lvs. scale-like.—Var. **Chamberlaynii** Carr. With spreading and reflexed brs. and pendulous brts.: lvs. mostly acicular, grayish green.—Var. **filífera** D. Hill. Broad-pyramidal form with slender much divided brts. and blue-gray lvs.

Low or dwarf forms: Var. **globòsa** Beiss. Compact globose form with bright green scale-like lvs.—Var. **tripartìta** R. Smith. Dwarf upright-spreading form of irregular dense habit with mostly acicular glaucous or bright green lvs.—Var. **Kòsteri** Beiss. Low form with wide-spreading brs. and glaucous lvs.—Var. **réptans** Beiss. Low shrub with slender spreading brs. and pendent brts.: lvs. bright green. M.G.11:296(h). (Var. *horizontalis* Arb. Kew.)

21. **J. scopulòrum** Sarg. Western Red Cedar. Tree to 12 m., with short trunk often dividing near base and with ascending brs. forming an irregular round-topped head; bark reddish brown, shreddy: brts. slender: lvs. rhombic-ovate, acute or acuminate, closely appressed, obscurely glandular, dark or yellowish green or glaucous: fr. subglobose, 6–8 mm. across, bright blue, bloomy, ripening the 2d season; seeds 1–2. S.S.14:t.739. C.B. 3:28. G.F.10:423(h). (*J. dealbata* Loud., not Dougl., *Sabina s.* Rydb.) Alb. to B. C., s. to w. Tex., n. Ariz. and Ore. Intr. 1836. Zone V.—Var.

argéntea D. Hill. Narrow-pyramidal form with very glaucous, almost silvery-white lvs.—Var. **viridifòlia** D. Hill. Pyramidal form with bright green lvs.—Var. **horizontàlis** D. Hill. Upright form with spreading brs. and very glaucous lvs.

22. **J. Sabìna** L. Savin. Shrub to 5 m., upright or more often low and spreading; brts. rather slender, of a strong disagreeable odor when bruised: scale-like lvs. rhombic-ovate, appressed, obtuse or acutish, 1 mm. long, glandular on back, dark green, acicular lvs. often present, slightly spreading, about 4 mm. long, concave and glaucous above with a prominent midrib: fls. monoecious or dioecious: frs. on scaly recurved brts., subglobose or ovoid, 5 mm. across, brownish blue, bloomy; seeds usually 2. C.B.3:26. B.N. 586,587(h). (*Sabina officinalis* Garcke.) Mts. of S.W. and C. Eu. to the Cauc. and Siberia. Cult. before 1580. Zone IV.—It does well on limestone soil.—Var. **variegàta** Carr. Tips of the brts. creamy-white and lvs. scale-like. —Var. **fastigiàta** Beiss. Columnar form with dark green, mostly scale-like lvs.—Var. **cupressifòlia** Ait. Low spreading or ascending shrub, rarely erect, usually with scale-like, often bluish green lvs. (Var. *humilis* Endl.).—Var. **tamariscifòlia** Ait. Low spreading shrub with mostly acicular, slightly spreading bright green lvs. on the primary brts. occasionally in 3's.—Var. **lusitànica** Aschers. & Graebn. Upright shrub with scale-like acuminate lvs. (*J. sabinoides* Griseb.) S. Eu.

23. **J. horizontàlis** Moench. Creeping J. Procumbent shrub with long trailing brs. furnished with numerous short brts.: lvs. acute or cuspidate, glandular on back, bluish green or steel-blue, acicular lvs. usually present, 2–6 mm. long, mucronate, slightly spreading: fr. 6–8 mm. across, on recurved stalks, light blue, scarcely bloomy, 1–4-seeded. B.B.1:67. C.B.3:27. B.E.t. 16(h). (*J. prostrata* Pers., J. *virginiana* var. *prostrata* Torr., *J. Sabina* var. *prostrata* Loud., *J. Sabina* var. *procumbens* Pursh, *J. Sabina* Am. Auth., not L.) N. S. to Alb., s. to N. J., Minn. and Mont. Intr. 1836. Zone I.—Valued as ground-cover for sandy and rocky soil.—Var. **Douglàsii** Rehd. Waukegan J. Trailing form with bright steel-blue lvs. turning pale purple in autumn with glaucous bloom.—Var. **alpìna** Rehd. Form with at first nearly upright stems becoming gradually procumbent, but with ascending or nearly upright brs., to 75 cm. high; lvs. mostly acicular, 3–4 mm. long, more or less glaucous, purplish in autumn. (*J. Sabina* var. *alpina* Loud.)—Var. **glomeràta** Rehd. Dwarf form, scarcely exceeding 20 cm., with very short brts. crowded into dense clusters, without long trailing brs.: lvs. all scale-like, minute, green.—Var. **plumòsa** Rehd. Depressed shrub with flattened top and nearly horizontally spreading brs.: lvs. linear, upright-spreading, 2–6 mm. long, tinged purplish in autumn. (*J. depressa plumosa* Hort.)

2. **CUPRÉSSUS** L. Cypress. Trees, rarely shrubs, aromatic; brts. densely clothed with small appressed lvs., 4-angled or terete, rarely somewhat flattened: lvs. opposite, scale-like, minutely denticulate-ciliate, only on young plants or shoots subulate and spreading: fls. solitary, terminating short brts.: staminate fls. ovoid to oblong, yellow, the stamens with 2–6 pendulous globose anther-cells; female fls. subglobose: cone globose or nearly so, ripening the second season, consisting of 6–12 ligneous peltate scales, usually with a mucro at the flattened apex; each scale with numerous compressed and angled narrowly winged seeds; cotyledons 3–4. (The classical name of *C. sempervirens*.) About 12 species in the warmer temperate and subtropical regions; in American from Ore. to Mexico, in the Old World from the Medit.

Reg. to China and Himal.—The majority of the species is tender, but the following which are the hardiest, will succeed at least in sheltered situations of the warmer parts of our area.

A. Lvs. obscurely glandular, dark or bright green: cone-scales 8–12.
B. Brts. rather stout, 1–1.5 mm. thick: boss of cone-scales thick.....1. *C. macrocarpa*
BB. Brts. slender, scarcely 1 mm. thick: boss of cone-scales thin .....2. *C. sempervirens*
AA. Lvs. with conspicuous, usually resinous gland on back: cone-scales 6–8, with a prominent, usually curved boss.
B. Lvs. blunt: brts. slender .....3. *C. Macnabiana*
BB. Lvs. pointed: brts. stout.....4. *C. arizonica*

1. **C. macrocárpa** Hartw. Monterey C. Tree to 25 m., pyramidal when young, with a broad crown in old age: bark separating into broad scaly ridges: brts. terete or slightly 4-angled: lvs. uniform, rhombic, obtuse, dark green; staminate fls. ovoid, 4 mm. long: cone globose or broad-ellipsoid, short-stalked, 2.5–3.5 cm. long; scales with a short ridge-like boss in the centre. S.S.10:t.525. G.C.III.22:53. G.F.7:245(h). Am. For. 29:270,271(h). (*C. Lambertiana* Gord.) Calif., s. of Monterey. Intr. 1838. Zone VIII.—Var. **fastigiàta** Carr. Brs. ascending forming a dense fastigiate head.—Var. **lùtea** Dicksons. Narrow pyramidal form with yellow lvs. S.N.111(h). Gn. 68:237(h).—Var. **Críppsii** Mast. A juvenile form with stiff brs. and spreading subulate lvs.

2. **C. sempérvirens** L. Italian C. Tree to 25 m. with erect or horizontal brs. and thin fissured bark; brts. terete or slightly 4-angled: lvs. uniform, rhombic, obtuse, dark green; staminate fls. oblong-cylindric, 4–5 mm. long: cone subglobose or ellipsoid, 2–3 cm. across; scales 8–14, contracted into a small point, sometimes flat or slightly impressed and mucronulate in the middle. H.W.1:196. C.B.2:73. S. Eu. and W. Asia. Planted since ancient times. Zone VIII?—Var. **stricta** Ait. Columnar Italian C. With erect or ascending brs. forming a columnar head. Gn. 33:3(h). G.W.9:127(h). (Var. *pyramidalis* Nym., var. *fastigiata* Beiss., *C. fastigiata* DC.)—Var. **índica** Parl. Of columnar habit: cone globose, with 10 acutely mucronate scales.—Var. **horizontàlis** Gord. With horizontally spreading brs. forming a broad-pyramidal head. (*C. h.* Mill.)

A closely related species is **C. Duclouxiàna** Hickel. Tree with spreading brs.; brts. usually slightly compressed: lvs. about 1 mm. long, obtusish, glaucescent: cones globose, 2–3 cm. across; scales usually 8, flat. Camus, Cyprès, 92. (*C. torulosa* Rehd. & Wils., not D. Don.) W. China. Intr. about 1900. Zone VII?

3. **C. Macnabiàna** Murr. Macnab C. Bushy tree, occasionally to 12 m., sometimes shrubby with several stems; brts. very slender: lvs. obtuse, with conspicuous resinous gland, dark green or glaucescent: staminate fls. broad-ovoid, 2–3 mm. long: fr. subglobose or ellipsoid, 2–2.5 cm. long; scales usually 6, rarely 8, the upper with prominent conical and incurved bosses, the lower with thinner and recurved bosses; seeds dark chestnut-brown, 1.5 mm. long. S.S.10:t.528. B.C.2:915(h). S.N.178(h). (*C. Bakeri* Jeps.) S. Ore. and Calif. Intr. 1854. Zone (V).—The hardiest of the true Cypresses.—Var. **sulphùrea** Berckmans. Brts. with yellow tips.

4. **C. arizònica** var. **bonìta** Lemm. Tree to 12, occasionally to 25 m.; bark red-brown, separating in large thin flakes or on older trees fissured and separating into long shreds: brts. rather stout: lvs. acute, thick, keeled, with conspicuous resinous gland, more or less glaucous: fr. subglobose to broad-ellipsoid, 2.5–3 cm. across; scales 6–8, flat or slightly depressed on back and abruptly contracted into a short mucro. I.T.3:t.145. G.C.III.57:315. M.D.13:t.4(h). (*C. glabra* Sudw., *C. arizonica* Hort.) C. and s. Ariz. Intr. 1882. Zone VII?—Var. **compácta** Schneid. Low roundish bush. S.N. 179

(h).—Var. **glauca** Woodall. Juvenile form of intensely silvery gray color. —The typical **C. arizonica** Greene from s. Ariz. differs chiefly in the usually glandless lvs. and in the smaller cones with larger, more prominent bosses.

3. **CHAMAECÝPARIS** Spach. Cypress. Tall pyramidal trees with scaly or deeply furrowed bark; leading shoots nodding; brs. spreading; brts. more or less frond-like arranged, usually flattened: lvs. opposite, scale-like (only in the juvenile state subulate), ovate to rhombic, acuminate to obtuse, entire: fls. minute, monoecious, the sexes on different brs.; staminate fls. ovoid to oblong, yellow, rarely red, consisting of numerous decussate stamens, each with 2–4 anther-cells: fr. globose, ripening the first season, with 6–12 peltate scales pointed or bossed in the middle; seeds 2, rarely up to 5, slightly compressed, with thin broad wings; cotyledons 2. (Greek *chamai*, on the ground, and *kyparissos*, cypress; in allusion to its affinity.) Syn. *Retinispora* Zucc. Six species in N. Am. and in Japan and Formosa.

A. Lvs. green on both sides or somewhat paler below, the lateral not much larger than the facial ones.
  B. Brts. compressed, slender, not distinctly 2-ranked: lvs. glandular, bluish green: cone about 6 mm. across ..... 1. *C. thyoides*
  BB. Brts. nearly 4-sided, stout: lvs. dark green, not glandular: cone nearly 1.2 cm. across. 2. *C. nootkatensis*
AA. Lvs. with glaucous or whitish marks below: brts. arranged in horizontal planes.
  B. Lvs. closely appressed, obtuse to acute, the lateral much larger than the facial ones: cones 8–12 mm. across.
    C. Lvs. acute or acutish, glandular, the white markings below sometimes indistinct: staminate fls. red ..... 3. *C. Lawsoniana*
    CC. Lvs. obtuse, not glandular, lustrous dark green, the white markings distinct. 4. *C. obtusa*
  BB. Lvs. loosely appressed, acuminate, the lateral not much larger than the facial ones: cones 6–8 mm. across ..... 5. *C. pisifera*

1. **C. thyoides** Brit. White Cedar. Tree to 25 m., with reddish brown bark fissured into flat connected ridges; brs. upright-spreading or horizontal, forming a narrow spire-like head; brts. slender, rather irregularly arranged; lvs. closely appressed or on vigorous brts. spreading at the apex, keeled, conspicuously glandular, dark bluish or light green: cones globose, finally bluish purple, bloomy; scales with acute, often reflexed bosses; seeds 1 or 2 on each scale, with wings as broad as the seed. S.S.10:t.t.529. B.N.529(h). M.G.11:301(h). (*C. sphaeroidea* Spach, *Cupressus t.* L.) Me. to Fla., w. to Miss.; in cold swamps. Intr. 1736. Zone III.—The least attractive, but hardiest species.—Var. **glaûca** Sudw. Compact shrub with glaucous or nearly silvery white lvs. (*C. sphaeroidea* var. *g.* Endl., var. *kewensis* Hort.)—Var. **variegâta** Sudw. Brts. variegated with yellow.—Var. **ericoìdes** Sudw. Low compact pyramidal bush: lvs. linear, spreading, with 2 glaucous lines beneath, usually changing to reddish brown in winter. B.C.5:2922. B.N.532. (*Retinispora e.* Hort.)—Var. **andelyénsis** Schneid. Of upright habit, with loosely appressed subulate lvs.; often part of the brts. like those of the type and others like those of the preceding var. B.C.5:2922. R.H.1880:36, 37(h). (Var. *leptoclada* Sudw., *C. sphaeroidea a.* Carr., *Retinispora leptoclada* Hort., not Zucc.)

2. **C. nootkaténsis** Sudw. Nootka C. Tree to 40 m., with brownish gray irregularly fissured bark separating into large thin scales; brs. ascending or spreading, forming a narrow pyramid; brts. usually pendulous, terete or 4-angled, on the upper part of the tree arranged on vertical planes: lvs. closely appressed, or on vigorous shoots spreading, acute, keeled or rounded on back and usually not glandular: staminate fls. bright yellow: cones subglobose, about 1 cm. across, dark red-brown, bloomy; scales 4–6, with erect pointed bosses

and often with resinous glands; seeds 2–4 on each scale, with broad wings. S.S.10:t.530. F.E.25:543(h). H.B.4:27(h). (*C. nutkaensis* Spach, *Cupressus n.* Lamb., *Thuyopsis borealis* Hort.—Sitka C., Yellow Cedar.) S.W. Alaska to Ore. Intr. 1853. Zone IV.—Handsome narrow-pyramidal tree with dark green lvs.—Var. **glaûca** Beiss. Lvs. very glaucous (*Cupressus nutkaensis g.* Reg.)—Var. **lûtea** Beiss. The young shoots light yellow changing finally to green. Gn.5068(h). J.L.27:427(h).—Var. **compácta** Beiss. Dwarf compact form. S.N.166(h).

3. **C. Lawsoniàna** Parl. Lawson C. Tree to 60 m., in cult. usually a narrow-pyramidal tree furnished to the ground with brs.; bark reddish brown, divided into round scaly ridges: brts. flattened, frond-like arranged in horizontal planes: lvs. closely appressed, acute or acutish, glandular, bright green to glaucous, marked below with often indistinct white streaks: staminate fls. crimson: cone globose, 8 mm. across, reddish brown and bloomy; scales 8, with thin, acute, reflexed bosses; seeds 2–4 on each scale, broadly winged. S.S.10: t.531. F.E.23:309(h);33:559(h). P.I.t.32(c,h). B.S.1:444(h). (*C. Boursieri* Decne., *Cupressus L.* Murr.) S.W. Ore. to n.w. Calif. Intr. 1854. Zone (V).—One of the most handsome Conifers, but not thriving well in a dry climate; it is very variable and about 80 garden forms are known in Eu.—Var. **glaûca** Beiss. With steel-blue lvs. M.G.31:310(h). Here belongs "Triomphe de Boskoop."—Var. **argéntea** Beiss. With nearly silvery white lvs.; here belongs "Silver Queen."—Var. **lûtea** Beiss. Of compact pyramidal habit; young growth bright yellow. S.N.t.5(hc).

Columnar forms: Var. **erécta** Sudw. Columnar dense form with the brts. arranged in vertical planes, bright green. (Var. *erecta viridis* Beiss., *Cupressus L. erecta viridis* Waterer.) G.C.III.58:272(h). S.N.168(h). A form of this with glaucous foliage is var. **"erecta glauca"** Beiss.—Var. **Allûmii** Beiss. Columnar form with bluish or steel-blue foliage. G.W.20:581(h).—Var. **Fràseri** Beiss. Similar to the preceding, but less narrow in habit and with dark bluish foliage. M.G.33:250(h).—Var. **Flétcheri** Fletcher & Sons. Slow growing dense columnar form with ascending brs.: lvs. intermediate between the juvenile and adult form, glaucous. Gn.77:274(h). H.D.32,t(h).

Spreading and pendulous forms: Var. **péndula** Beiss. With more or less spreading brs. and pendulous brts. F.E.27:187(h). A form of this with the brs. as well as the brts. pendulous is var. **"pendula vera"** Hesse.—Var. **grácilis** Beiss. A graceful form with pendulous brts.: lvs. bright green, with slightly spreading tips. (Var. *gracilis pendula* Hort.)—Var. **filifórmis** Beiss. Brs. spreading or slightly pendulous, the terminal brts. much elongated and with few short lateral brts., pendulous. Gs.6:231.—Var. **intertéxta** Beiss. Pyramidal form with remote arching brs. and distant thickish brts., bluish green. B.N.550(h).

Dwarf forms: Var. **nàna** Beiss. Dwarf globose or ovoid form with stiff short brts., dark green. B.N.553(h). A form of this with bluish green lvs. is var. **"nana glauca"** Beiss.—Var. **"mínima glauca"** Beiss. is a dwarf and compact conical form with dark steel-blue lvs.

4. **C. obtûsa** Endl. Hinoki C. Tree to 40 m., with broad-pyramidal head: bark reddish brown, rather smooth, peeling off in thin strips: brts. arranged in horizontal planes: lvs. closely appressed, obtuse, dark green above, with white marks below, the facial ones more acutish, often keeled, not glandular: cones globose, 8–10 mm. across, orange-brown; scales 8, rarely 10, depressed on back and with a small mucro: seeds 2–5 on each scale, narrowly winged. S.Z.2:t.121(c). S.I.1:t.10(c). W.C.t.54, 55(h). (*Retinispora o.* Sieb. & Zucc.,

Cupressus o. K. Koch.) Japan and in a slightly differing var. in Formosa (var. **formosàna** Hayata). Intr. 1861. Zone III.—An ornamental tree of rather slow growth; it does not do well in a dry climate and dislikes lime.

Forms differing in color: Var. **albo-spicàta** Beiss. Young shoots at first creamy-white, changing to pale green.—Var. **aùrea** Beiss. With golden yellow lvs. S.N.t.6(hc). Gn.M.2:27(h).—Var. **Críppsii** Rehd. With pale yellow lvs.—Var. **"grácilis aùrea"** Beiss. A graceful form with slender slightly pendulous brts., golden yellow at first, changing later to greenish yellow.—Var. **tetragòna** Rehd. A dwarf broad-pyramidal form, with crowded irregular brt.-systems; brts. more or less 4-angled and partly golden-yellow. H.D.43, t.(h).

Forms differing in habit: Var. **magnífica** Beiss. Vigorous form with stout brts. and lustrous bright green lvs.—Var. **erécta** Beiss. Fastigiate form with ascending brs. and bright green lvs.—Var. **grácilis** Nash. Compact pyramidal form, dark green; brts. with slightly pendulous tips.—Var. **compácta** Hartw. & Ruempl. Dwarf, broad-conical form with much crowded short brts. at the end of short brs. G.C.III.78:371(h). B.E.t.18(h, as var. *nana*).—Var. **nàna** Carr. Low form of slow growth, with spreading brs. and short dark green brts. R.H.1882:102. A form of this with the young growth golden yellow is var. **"nana aurea"** Carr.—Var. **pýgmaea** Carr. A very dwarf form with horizontal, almost creeping brs. and short close-set brts. R.H.1889:376(h). Interesting form for rockeries.

Juvenile form: Var. **ericoìdes** Boehmer. Dense broad-conical or subglobose bush with rather stout brts. and spreading linear obtuse lvs. 3–5 mm. long, thickish and bluish gray. G.C.III.33:f.107(h). H.D.42,t(h). (*Juniperus Sanderi* Hort., *Retinispora Sanderi* Sander, *Cupressus pisifera* var. *Sanderi* Dallim. & Jacks.)

5. **C. pisífera** Endl. Sawara C. Tree to 50 m., with horizontally spreading brs. forming a narrow-pyramidal head; bark red-brown, rather smooth, peeling off in thin strips: brts. flattened, 2-ranked and arranged in horizontal planes: lvs. appressed, acuminate, ovate-lanceolate, with slightly spreading tips, obscurely glandular, dark green above, with whitish lines beneath: cones globose, 6 mm. across, dark brown; scales 10, sometimes 12, with a small mucro at the depressed centre; seeds 1–2, broadly winged. S.Z.2:t.122(c). P.I.t.34(c, h). W.C.t.56, 57(h). (*Retinispora p.* Sieb. & Zucc., *Cupressus p.* K. Koch.) Japan. Introd. 1861. Zone III.—A narrow-pyramidal tree of fairly rapid growth and rather loose habit; it is apt to become soon thin and to lose its lower brs.—Var. **aùrea** Carr. Foliage golden-yellow. G.W.20:581(h).—Var. **sulphùrea** Schelle. Foliage light yellow.—Var. **filífera** Beiss. Pyramidal shrub or small tree with spreading and elongated pendulous thread-like brs. and with short and remote lateral brts.: lvs. subulate, distant, sharply pointed. (*Retinispora f.* Standish, *C. p. filifera pendula* Hort.) G.C.II.5:237. B.N. 572, 571(h). S.N.62(h). Forms of this var. are var. **"filifera aùrea"** Beiss. with the young growth golden yellow and var. **"filifera aùreo-variegàta"** Beiss. with the brts. variegated with yellow, but less elongated.

Juvenile forms: Var. **plumòsa** Beiss. A transition between the type and var. *squarrosa*. Of dense conical habit: brs. ascending; ultimate brts. frond-like arranged, feathery: lvs. slightly spreading, subulate, 3–4 mm. long, bright green outside, whitened on the inner face. B.C.2:731. Gn.M.2:27(h). S.N.108(h). (*Retinispora p.* Veitch.) Intr. 1861. Color forms of this var. are: Var. **"plumosa argéntea"** Beiss. with the tips of the brts. whitish; var. **"plumosa aùrea"** Beiss. with the young growth golden yellow. B.E.215; var.

"plumosa flavéscens" Beiss. with the tips of the young brts. yellowish.—Var. **squarrôsa** Beiss. & Hochst. Dense bush or small tree; brts. irregularly arranged, not frond-like, feathery: lvs. spreading, flat, linear, about 6 mm. long, rather soft, glaucous. B.E.215. B.C.2:731. M.G.24:44(h). Intr. 1843. A form with yellow foliage is var.**"squarrôsa sulphûrea"** Beiss.

4. **THUJÓPSIS** Sieb. & Zucc. Tree of pyramidal habit with spreading brs. and frond-like arranged brts. spreading in horizontal planes; brts. much flattened, broad: lvs. opposite, the lateral ones somewhat spreading, ovate-lanceolate and curved (hatchet-shaped), acutish, the facial ones ovate-oblong, obtuse: staminate fls. cylindric with 6–10 pairs of stamens; pistillate fls. with 4–5 ovules under each scale: cone subglobose; scales 6–8, woody, flat, imbricate, usually with a boss or mucro below the apex; the upper pair sterile, the fertile ones with 3–5 winged seeds; cotyledons 2. (Thuja and Greek *opsis*, likeness.) One species in Japan.

T. dolobràta Sieb. & Zucc. Hiba Arbor-vitae. Pyramidal tree to 15 m., with irregularly whorled or scattered horizontally spreading brs. nodding at the ends; brts. 5–6 mm. broad: lvs. glossy dark green above, with conspicuous white patches below, 4–6 mm. long: cone broad-ovoid, 1.2–1.5 cm. long; scales with a prominent often curved boss below the apex. (*T. d.* var. *aus-, tralis* Henry, *Thuja d.* L.) S.Z.2:t.119,120(c). S.I.1:t.11(c). C. Japan. Intr. 1853, 1861 to Am. Zone VI.—A handsome ornamental tree, of slow growth in cult.; not doing well in a dry climate.—Var. **variegàta** Fort. Tips of brts. creamy-white.—Var. **nàna** Sieb. & Zucc. A dwarf and slow-growing form with slenderer brs. and smaller, lighter green lvs. (Var. *laetevirens* Mast., T. *laetevirens* Lindl.)—Var. **Hondai** Makino. Tree to 30 m.: brts. more closely set, partly overlapping: lvs. smaller: cones globose, 1.5–1.8 cm. across; the scales with a short mucro or only with a narrow ridge. W.C.t.50, 51(h). (*T. H.* Henry.) N. Japan. Intr. 1915.—This variety may prove hardier and more satisfactory in the Eastern States than the type.

5. **LIBOCÉDRUS** Endl. Trees with scaly bark, spreading or erect brs. and compressed or rarely 4-angled brts. arranged in one plane: lvs. decussate, scale-like, decurrent at base, with or without gland: fls. monoecious, the two sexes on different brts., rarely dioecious; male fls. oblong, with 12–16 decussate stamens; female oblong; fertile scales with 2 ovules: cones oblong, with 4–6 woody, flat scales mucronulate at the apex, the lower pair short, reflexed and sterile; the middle pair oblong and fertile, the upper pair, if present, connate into an erect partition; seeds with one short and one long wing nearly equaling the scale; cotyledons 2. (Greek *libas*, drop, tear, and *cedrus*, referring to the resinous character of the trees.)—Eight species in western N. and S. America, N. Zeal., N. Caledonia, N. Guinea, Formosa and S.W. China. Only the following species is hardy within our area, though possible *L. chilensis* Endl. may survive in sheltered positions along the southern limit.

L. decúrrens Torr. Incense Cedar. Tree to 45 m., with spreading short brs. forming a narrow-pyramidal head, irregular in old age; bark cinnamon-red, broken into irregular scaly ridges; brts. much flattened, bright green on both sides: lvs. oblong-ovate, acuminate, closely adnate to the brts., free at the apex, the lateral ones as long as and nearly covering the obscurely glandular facial ones, 3 mm. long on the lateral brts.: cones oblong, 2–2.5 cm. long, pendulous, light reddish brown; scales mucronate below the apex; the upper sterile pair connate; seeds oblong-lanceolate, 8–12 mm. long. S.S.

10:534. B.S.2:25,t.(h). E.H.3,t.142(h). G.C.III.44:338(h). (*L. Craigana* Low, *Heyderia d.* K. Koch, *Thuja gigantea* Carr., not Nutt.) Orc. to w. Nev. and L. Calif. Intr. 1853. Zone (V).—Handsome tree of remarkably columnar habit with dark green foliage. A few garden forms as var. *compacta* Beiss., var. *glauca* Beiss. and var. *aureo-variegata* Schwerin are known.

6. **THÙJA** L. Arbor-vitae. Trees with scaly bark and short spreading or erect brs. forming a pyramidal head: brts. flattened, disposed in one plane: lvs. decussate, scale-like, the lateral lvs. nearly covering the facial ones: fls. monoecious, staminate ovoid, with 6–12 decussate stamens: cones ovoid-oblong or ovoid; scales 8–12, with a thickened ridge or a boss at the apex, the 2 or 3 middle pairs fertile; seeds 2 or 3 under each scale, thin and with broad wings or thick and wingless; cotyledons 2. (Ancient Greek name.) Six species in N. Am. and E. Asia. All the species except *T. setchuenensis* Franch. from W. China are in cult.

A. Brts. disposed in horizontal planes: cone-scales thin; seeds thin, winged. Subgen. I. EUTHUJA
  B. Lvs. of primary axes widely spaced, ending in a long point parallel to the axis.
    C. Primary axis flattened: lvs. conspicuously glandular, yellowish or bluish green below. 1. *T. occidentalis*
    CC. Primary axis nearly terete: lvs. not or inconspicuously glandular, usually with whitish markings below ..... 2. *T. plicata*
  BB. Lvs. of primary axes close, ending in a short spreading point; brts. with white markings below.
    C. Lvs. glandless, slightly or not concave below: brts. thickish, compressed, but scarcely flattened ..... 3. *T. Standishii*
    CC. Lvs. glandular, concave or grooved below and with conspicuous white markings: brts. much flattened ..... 4. *T. koraiensis*
AA. Brts. in vertical planes, green on both sides: cone-scales thick; seeds ellipsoid, wingless. Subgen. II. BIOTA ..... 5. *T. orientalis*

1. **T. occidentàlis** L. American Arbor-vitae. Tree to 20 m., with stout buttressed trunk and short spreading brs. forming a pyramidal head; bark reddish brown, fissured into narrow ridges covered with elongated scales: lvs. abruptly pointed, dark green above, those of the main axes conspicuously glandular, on the brts. sometimes inconspicuously so: male catkins globose, with 3 pairs of stamens: cone oblong, 8 mm. long, light brown; scales 8–10, usually 4 fertile, with a minute mucro at apex; seeds 3 mm. long. S.S.10:t.532. G.C.III.21:213. S.N.287(h). N. S. to Man., s. to N. C., Tenn., and Ill. Intr. about 1534. Zone II.—Ornamental pyramidal tree of rather slow growth in cult., with numerous mostly shrubby horticultural forms.

Forms distinguished by color: Var. **alba** Gord. Tips of young brts. white. (Var. *albo-spicata* Beiss., var. *Queen Victoria* Hort.)—Var. **variegàta** West. Brts. variegated with white. (Var. *argentea* Carr., var. *albo-variegata* Beiss.)—Var. **Colúmbia** Parsons. Columnar form: foliage with silvery variegation, more pronounced in winter. B.E.t.20(h).—Var. **Vervaèneana** Gord. Smaller and denser than the type; brts. slenderer, yellowish bronzy in winter. S.N.t.9(hc).—Var. **aureo-variegàta** Henk. & Hochst. Lvs. variegated with golden yellow. (Var. *aurea-maculata* Hort., var. *Wareana aurea* Hort.)—Var. **lutéscens** Hesse. A form of var. *robusta* with yellow lvs. (Var. *Wareana lutescens* Hesse.)—Var. **aùrea** Nels. Broad bushy form with deep yellow lvs.—Var. **semperaùrea** Hort. A vigorous form with golden-yellow lvs.—Var. **lùtea** Kent. Pyramidal form with bright yellow lvs. (Var. *elegantissima* Hort., var. *"George Peabody golden."*)

Pyramidal or fastigiate forms: Var. **robústa** Carr. Pyramidal form, lower and denser than the type; brts. stouter, bright green. R.H.1908:79(h). (Var. *Wareana* Nels., var. *densa* Gord., *T. sibirica* Hoopes, *T. caucasica* and *T. tatarica* Hort.)—Var. **Rivérsii** Beiss. Compact pyramidal form with yellowish

green lvs.—Var. **víridis** Beiss. Compact narrow-pyramidal form with lustrous dark green lvs. (Var. *erecta viridis* Nichols.)—Var. **Rosenthàlii** Ohlendorff. Columnar form with lustrous dark green lvs.—Var. **"Douglásii pyramidàlis"** Spaeth. Dense narrow-pyramidal form with crowded frond-like arranged brts., often cristate at end of brs.—Var. **filicoìdes** Beiss. Narrow-pyramidal form with the short ultimate brts. pinnately arranged.—Var. **theodonénsis** Beiss. Compact pyramidal form with thicker and broader brts. and dark green lvs. (Var. *magnifica* Hort.)—Var. **compácta** Carr. Pyramidal form of denser habit and slower growth than the type.—Var. **Buchanàni** Parsons. Graceful narrow-pyramidal form with slender brts. and rather remote and irregularly arranged thin brts., grayish green. B.E.t.20(h).—Var. **fastigiàta** Jacg. Columnar form with short brs. Gt.45:508(h). (Var. *columnaris* Mast., var. *stricta* Hort., var. *pyramidalis* Hort.)—Var. **plicàta** Mast. Pyramidal tree darker and denser than the type; brts. short, rigid, much flattened, disposed in vertical planes: lvs. distinctly glandular, brownish dark green above, bluish green beneath. G.C.III.21:258. (*T. plicata* Parl., not Don.)

Globose or dwarf forms: Var. **globòsa** Gord. Compact globose form with bright green lvs. B.E.t.21(h). (Var. *Spihlmannii* P. Smith, var. *globosa Speelmanni* Hort., var. *Froebeli* Hort., var. *compacta* Beiss., not Carr., var. *"Tom Thumb"* Hort.)—Var. **Woodwârdii** Spaeth. Dense globose form with deep green lvs. B.E.t.21(h).—Var. **Hoveyi** Gord. Dwarf globose-ovoid form with rather light green lvs.—Var. **pumila** Beiss. Dwarf dense form with dark green lvs. (Var. "Little gem" Hort.)—Var. **umbraculífera** Beiss. Dwarf dense form with umbrella-like top; brts. thin, dark green. S.N.288(h).

Pendulous or irregular forms: Var. **péndula** Gord. Brs. bending downward and brts. tufted and pendulous.—Var. **filifórmis** Beiss. Low bushy form with long and slender sparingly ramified brts., nodding at the tips, partly 4-angled and clothed with sharply pointed lvs. B.E.224. M.G.16:357(h). (Var. *Douglasii* Rehd.)—Var. **Ohlendórffii** Beiss. Bushy form with 2 kinds of lvs., the upper brts. mostly similar to those of var. *filiformis*, the lower to those of var. *ericoides*. B.E.225. (Var. *Spaethii* P. Smith.)—Var. **cristàta** Carr. Irregular dwarf pyramidal form with crowded stout often recurved brts.

Juvenile forms: Var. **ericoìdes** Beiss. & Hochst. Dwarf broad-pyramidal or bushy form with slender brts. clothed with spreading linear soft lvs. dull green above, grayish green beneath and assuming a brownish tint in winter. R.H.1880:93, 94. B.C.6:3336. (*Retinispora dubia* Carr., *R. ericoides* Hort., not Zucc.)—Var. **Ellwangeriàna** Beiss. Low broad pyramid, with slender brts. clothed with two kinds of lvs., adult scale-like and juvenile linear and spreading lvs. R.H.1880:93. B.C.6:3336. A form with yellow lvs. is var. **"Ellwangeriana aûrea"** Beiss.

2. **T. plicàta** Don. Giant A. Tall tree, to 60 m., with stout buttressed trunk and short horizontally spreading brs. pendulous at the ends and forming a narrow pyramidal head; bark cinnamon-red, fissured into scaly ridges; brts. slender, regularly and closely set: lvs. bright green and glossy above, with whitish marks below, those of the main axes ovate, acuminate and usually glandular, those of the lateral brts. acute and mucronate and not or scarcely glandular: cones oblong, 1.2 cm. long; scales 10–12, usually 6 fertile; seeds often 3 to each scale, notched at apex. S.S.10:t.533. G.C.III.21:215. S.N.2:92(h). (*T. gigantea* Nutt., *T. Menziesii* Dougl., *T. Lobbii* Hort.) Alaska to N. Calif. and Mont. Intr. 1853. Zone V.—Ornamental tree of rapid growth with lustrous bright green lvs.—Var. **atróvirens** Sudw. With

dark green lvs. (*T. Lobbii a.* Hort.)—Var. **fastigiàta** Schneid. Columnar form. (*T. gigantea f.* Beiss., *T. gigantea pyramidalis* Bean.)—Var. **péndula** Schneid. With slender pendulous brs. (*T. gigantea p.* Beiss.)

3. **T. Standíshii** Carr. JAPANESE A. Tree to 18 m., with spreading or somewhat ascending brs. forming a broad pyramid; bark reddish brown, thin, separating into small scales leaving pale gray blotches; brts. rather thick, compressed: lvs. bright green above, with triangular white marks below, glandless, those of the lateral brts. ovate, obtuse: cones ovoid, 8–10 mm. long, dark brown; scales 10–12, broad-ovate, the 2 middle pairs fertile; seeds 3 to each scale, with narrow wings, not notched at apex. S.I.1:t.11(c). G.C.III.21:215. W.C.52, 53(h). (*T. japonica* Maxim., *T. gigantea* var. *japonica* Franch., *Thujopsis S.* Gord.) Japan. Intr. 1860. Zone V.—Handsome tree with broad head, quite different in habit from the preceding species.

4. **T. koraiénsis** Nakai. KOREAN A. Low spreading shrub, usually with decumbent brs., rarely a slender, narrow-pyramidal tree to 8 m. with spreading brs. ascending at the ends; bark thin, scaly, chocolate-brown; brts. much flattened: lvs. of lateral brts. deltoid or rhombic, acutish or obtuse, bright green above, glaucous beneath, glandular: cones elliptic-ovoid, about 8 mm. long, light brown; scales 8, those of the 2 middle fertile pairs oval to narrow-obovate; seeds emarginate at apex. Korea. Intr. 1918. Zone V.

5. **T. orientàlis** L. ORIENTAL A. Pyramidal or bushy tree, with spreading and ascending brs. and with the trunk branching from near the base; bark thin, reddish brown, separating into papery scales; brts. very slender: lvs. bright green, nearly alike on both sides, those of the main axes glandular, ending in a free, rather spreading point, those of the lateral brs. closely appressed, glandular: cones ovoid, 1.5–2.5 cm. long, fleshy and bluish before ripening; scales usually 6, thick, ovate, obtuse, produced below the apex into a hooked boss; seeds 2 to each scale, ovoid, brown. S.Z.2:t.118(c). B.N.518. S.N.65(h). (*Biota o.* Endl.) N. and W. China, Korea; much cult. in Japan. Intr. before 1737. Zone V or VI.—Ornamental tree; its garden forms more often planted than the type.—Var. **elegantíssima** Vos. Of compact pyramidal habit, bright yellow in spring, greenish yellow later. S.N.t.11(hc).—Var. **beverleyénsis** Rehd. Pyramidal form with golden yellow lvs.—Var. **conspícua** Berckmans. Of compact fastigiate habit, golden yellow, suffused with green. Berckmans Cat. 1915–16:54(h).—Var. **aùrea** Dauvesse. Bushy subglobose form, golden yellow in spring, changing later to yellowish green. (*Biota o. aurea nana* Sénécl.)—Var. **semperauréscens** Nichols. Dwarf subglobose form retaining its golden yellow color throughout the year.—Var. **Sieb6ldii** Laws. Low compact subglobose form with bright green lvs. (*Biota o.* var. *S.* Endl., var. *japonica* Sieb., var. *compacta* Beiss.)—Var. **strícta** Loud. Dense pyramidal form with ascending brs. and bright green lvs. (*Biota o.* var. *pyramidalis* Endl., *T. pyramidalis* Ten., *T. tatarica* Lodd.)—Var. **flagellifórmis** Jacques. Pyramidal form with sparingly ramified thread-like pendulous brts. with distant and acuminate lvs. C.B.3:77. S.N.291(h). (Var. *pendula* Mast., *Biota o. filiformis* Henk. & Hochst., *T. filiformis* Lindl., *T. pendula* Lamb.)

Juvenile forms: Var. **decussàta** Mast. Dwarf bushy form with spreading stiff linear-lanceolate and acute bluish green lvs. (*Biota o. d.* Beiss. & Hochst., *Retinispora juniperoides* Carr.)—Var. **meldénsis** Mast. Of narrow-pyramidal, somewhat irregular habit: lvs. partly like those of var. *decussata*, partly passing into the normal form.

7. **FITZROŸA** Hook. f. Fitzroya. Evergreen tree, irregularly branched; brts. angled: lvs. ternate, decurrent, their free part spreading: fls. dioecious, the staminate axillary, solitary, cylindric, consisting of 15–24 stamens in ternate whorls: cone small, globose, with 3 ternate whorls of valvate scales, the lower whorl small and sterile, the middle one sterile or fertile and the upper one fertile; each fertile scale with a prominent compressed umbo on back and with 2–6 seeds 2- or 3-winged; cotyledons 2. (After Capt. R. Fitzroy of the British Navy; died in 1855.) One species in Chile.

F. cupressoïdes Johnston. Tree to 15 m., in cult. often shrubby; bark thick, reddish, deeply furrowed: lvs. ternate or occasionally opposite, spreading or somewhat imbricate, ovate-oblong to narrow-oblong, with incurved mucronate tip, about 3 mm. long, concave above and with 2 narrow stomatic lines, with 2 white bands beneath: cones globose, 8 mm. across. B.M.4616(c). D.J.228, t.13(h). (*F. patagonica* Hook. f., *Pinus c.* Molina.) S. Chile. Intr. 1849. Zone VIII.

8. **TAXÒDIUM** Rich. Deciduous or evergreen trees with light brown, furrowed and scaly bark and upright or spreading brs.; brts. of two kinds, those near the apex of the shoot persistent and with axillary buds, those on the lower part of the shoot without axillary buds and deciduous; winter-buds globose, scaly: lvs. alternate, flat, linear with two stomatic bands below, those of the deciduous brts. usually spreading in two ranks, those of the persistent brts. spreading radially: fls. monoecious, the staminate ovoid, consisting of 6–8 stamens and forming terminal long and drooping panicles, the female ones scattered, near the ends of the brs. of the preceding year, subglobose, consisting of 2-ovuled scales: fr. a short-stalked globose or ovoid cone ripening the first year and consisting of many thick, coriaceous peltate scales dilated from a slender stipe into an irregularly 4-sided, often mucronate, disk; each fertile scale with 2 unequally 3-angled seeds with 3 thick wings: cotyledons 4–9. (Greek, similar to Taxus.) Two species in E. N. Am. and Mex.

A. Lvs. linear, spreading, 2-ranked: brts. horizontal ..... 1. *T. distichum*
AA. Lvs. subulate, appressed: brts. upright ..... 2. *T. ascendens*

T. dístichum Rich. Bald Cypress. Tree occasionally 50 m. tall, with a tapering trunk strongly buttressed at the base, pyramidal while young, in old age usually spreading with broad rounded head; young brts. green, becoming brown the first winter; the 2-ranked lvs. linear-lanceolate, apiculate, 1–1.5 cm. long, soft bright green, yellowish green or whitish below, turning dull orange brown before falling: panicle of staminate fls. 10–12 cm. long: cone globose or obovoid, about 2.5 cm. across; disk of scales rugose, usually without mucro. S.S.10:t.537. G.F.3:7(h). S.N.21&t.10(h). M.G.11:303(h). (*Cupressus disticha* L.) Del. to Fla., w. to s. Ill., Mo., Ark. and La.; in swamps and on banks of streams. Intr. 1640. Zone V.—Particularly in wet and occasionally inundated situations the roots produce woody cylindrical projections sometimes 2 m. high and 30 cm. in diam. known as "cypress-knees." —A handsome ornamental tree with feathery light green foliage.

2. **T. ascéndens** Brongn. Pond Cypress. Tree to 25 m.; trunk much enlarged at base; bark thick, furrowed: brs. spreading; brts. upright: lvs. appressed and incurved, subulate, 5–10 mm. long: fls. and frs. similar to those of *T. distichum*. B.M.5603(c). G.C.III.66:258, 259. Jour. N. Y. Bot. Gard. 21:t.246(h). (*T. imbricarium* Harper, *T. distichum* var. *imbricarium* Croom.) Va. to Fla. and Ala.; in lakes, ponds and small rivers, usually over clay sub-

soil. Cult. 1789.—Less handsome than the preceding species, with a narrower and thinner head.—Var. **nùtans** Rehd. With pendulous brts. B.N.468. H.B.3:449(h). (Var. *pendulum* Schneid., *T. distichum* var. *n.* Loud., *Glyptostrobus pendulus* Endl.) Cult. 1789.

A closely related genus from China is **Glyptóstrobus** Endl. which differs chiefly in its elongated, not peltate scales. The only species, **G. pénsilis** K. Koch (*G. heterophylla* Endl., *G. sinensis* Loder), is not hardy within our area. Also the Mexican **Taxodium mucronàtum** Ten. (*T. distichum* var. *m.* Henry) with persistent lvs. is not hardy, but it is occasionally planted in Calif.

9. **SEQUÒIA** Endl. Tall evergreen trees with thick bark consisting of two layers, the outer spongy and fibrous, the inner thin and firm; brs. horizontally spreading; lateral brts. deciduous; buds scaly or naked: lvs. decurrent, linear and 2-ranked or ovate-lanceolate and more or less appressed: fls. monoecious; the male terminate and axillary, with numerous spirally arranged stamens; the female terminal, ovoid or oblong, composed of spirally arranged, imbricated scales, each fertile one with 5–7 ovules in two rows: fr. a pendulous ovoid cone with woody scales widening from a wedge-shaped base into a rhombic-oblong wrinkled disk with transverse median depression and often with a small mucro; seeds 5–7 under each scale, oblong-ovoid, compressed, with 2 lateral wings; cotyledons 4–6. (After Sequoiah, the inventor of the Cherokee alphabet; 1770–1843.) Two species in Calif.

A. Lvs. of the lateral brts. spreading in 2 ranks, linear, narrowed at the base, about 1–1.5 cm. long ..... 1. *S. sempervirens*
AA Lvs. more or less appressed, spirally disposed, ovate-lanceolate, 3–6 mm. long. 2. *S. gigantea*

1. **S. sempérvirens** Endl. Redwood. Tall tree, attaining 110 m., with the trunk occasionally to 25 m. in girth, pyramidal while young; bark reddish brown, 20–30 cm. thick; buds with imbricate acute scales: lvs. of two kinds, those of the lateral brts. 2-ranked, linear, or linear-lanceolate, acute, dark green and grooved above, with two whitish bands below, 6–18 mm. long, those of the leading shoots appressed or somewhat spreading, spirally disposed, ovate-oblong with an incurved callous point, about 6 mm. long, with 2 stomatiferous bands above: male fls. ovoid, 1.5 mm. long; female fls. with about 20 scales: cone ellipsoid, 2–2.5 cm. long, ripening the first year; scales abruptly enlarged into a disk about 8 mm. wide, usually without mucro, seeds light brown, 1.5 mm. long, with wings as broad as their body. S.S.10: 535. B.S.2:510(h). B.E.t.23(h). Calif. and s. Oreg., near the coast. Intr. probably 1843. Zone VIII.—Var. **adprèssa** Carr. Lvs. shorter, 6–8 mm. long, and young tips creamy white. (Var. *albo-spica* Hort.)—Var. **glauca** R. Smith. lvs. glaucous.—Var. **péndula** Rovelli. Brs. spreading and pendulous. S.N. 271(h).—This species demands a moist and cool climate; in a drier climate it is apt to become soon scraggy; it suckers from the root and is occasionally seen in cult. as a bush of stool-shoots appearing after the main stem has been injured or killed.

2. **S. gigantèa** Decne. Giant Sequoia. Tall tree, attaining 100 m., occasionally 30 m. in girth above the much enlarged and buttressed base; pyramidal and densely branched while young, in old age free of branches to 50 m.; bark 30–60 cm. thick; brts. not 2-ranked; buds naked: lvs. ovate to lanceolate, 3–6 mm., on the main axis up to 1.2 cm. long, rigid, sharply pointed, slightly spreading, rounded below, concave above, with two stomatiferous bands: male fls. 4–8 mm. long; female fls. with 25–40 scales: cone ovoid-oblong, 5–8 cm. long, dark reddish brown, ripening the 2nd year; scales gradually thickened into a 6–10 mm. wide disk pitted in the middle and often

mucronate; seeds light brown, 3–6 mm. long; wings broader than the body. S.S.10: 536. P.I.112(c,h). E.H.3:t.196(h). G.C.III.78:107(h). (*S. Wellingtonia* Seem., *S. Washingtoniana* Sudw., *Wellingtonia g.* Lindl.) Calif., w. slopes of the Sierra Nevada. Intr. 1853. Zone VI.—Var. **aùrea** Nichols. Young brs. yellow.—Var. **péndula** Lav. Brs. strongly deflexed and appressed to the stem so as to form a very narrow column. M.G.17:133(h). R.H.1906:395 (h). G. C. III.31:383(h);78:105(h).—In cult. a narrow-pyramidal tree usually clothed to the ground with spreading brs.

10. **CRYPTOMÉRIA** D. Don. Cryptomeria. Evergreen tree with reddish brown bark peeling off in long shreds, pyramidal, with spreading brs.: buds minute: lvs. spirally arranged in 5 vertical ranks, decurrent, directed forward and curved inward, awl-shaped, laterally compressed: fls. monoecious, staminate fls. oblong, composed of numerous imbricate stamens, axillary, sessile, forming short spikes at the end of the brts.; female fls. globular, solitary at the end of short brts.: fr. a brown, subglobose cone ripening the first year, but persistent after shedding the seeds; scales 20–30, woody, wedge-shaped, enlarged above into a disk with a recurved mucro in the middle and with 3–5 pointed rigid processes on the upper margin; seeds 2–5 to each scale, triangular-oblong and slightly compressed, narrowly winged; cotyledons 2–3. (Greek *kryptos*, hidden, and *meros*, part; meaning obscure.) One species in Japan.

C. japónica D. Don. Tree to 50 m. and to 6–10 m. in girth: lvs. linear-subulate, acutish, curved inwards, laterally compressed, keeled above and below, with stomata on both sides, 6–8 mm. long, bright green: staminate fls. about 6 mm. long: cone globose, 1.5–2.5 cm. across; seeds dark brown, 5–6 mm. long. S.Z.2:t.124(c). P.I.114(c,h). W.C.t.48(h). E.H.1:t.42(h). Japan, China. The typical form is var. **japonica** Henry. Pyramidal tree with stout dark green lvs: cone-scales with long-acuminate processes and long-pointed bracts, giving the cone a spiny appearance. Japan. Intr. 1861. Zone (V) or VI.—Var. **sinénsis** Sieb. Tree of looser habit, with deflexed brs. and slender brts.: lvs. longer and slenderer: cone-scales about 20, with shorter mucro and shorter less pointed processes; seeds often only 2. H.I.7:668. (*C. Fortunei* Hooibrenk, *C. Kawaii* Hayata.) S. China. Intr. before 1840. Tenderer than the type.

The following are garden forms of the Japanese plant: Var. **Lóbbii** Carr. Narrow-pyramidal tree with short and densely ramified brs.: lvs. rather short and lighter green. (*C. L.* Hort.) Intr. 1845. It differs scarcely from the type.—Var. **compácta** Beiss. Compact conical form with bluish green short and stiff lvs.—Var. **pungens** Carr. Compact form with stiff and spreading, sharply pointed dark green lvs.—Var. **araucarioìdes** Henk. & Hochst. Brs. deflexed, with long and distant pendulous brts.: lvs. short, stout and stiff, incurved at apex, bright green. S.Z.2:t.124b, f.2, 3.—Var. **nana** Carr. Dwarf and dense, spreading or procumbent form with short stiff lvs.—Var. **élegans** Mast. Densely branched bushy tree: lvs. spreading and often recurved, soft and slender, flattened, grooved, 1–2.5 cm. long, glaucous green, changing in winter to a reddish bronze color. D.J.181g. B.E.t.24(h). Intr. 1861. A juvenile form, rather short-lived and rarely bearing cones.

11. **CUNNINGHÁMIA** R. Br. China-Fir. Evergreen trees with spreading brs. pendulous at the ends: lvs. spirally arranged, decurrent, linear-lanceolate, serrulate, spreading in 2 ranks: fls. monoecious; staminate fls.

cylindric-oblong, in terminal clusters: female fls. globose, 1–3 at the end of the brs.: cone subglobose with coriaceous, broad-ovate pointed and irregularly serrate scales, persisting after escape of the seeds: each scale with 3 narrow-winged seeds; cotyledons 2. (After J. Cunningham who discovered the following species in 1702.) Two species in E. Asia.

C. lanceolàta Hook. Tree to 25 m.; bark brownish, scaling off in irregular plates and exposing the reddish inner bark: lvs. crowded, linear-lanceolate, with broad decurrent base, sharply pointed, 3–6 cm. long, lustrous above, with 2 broad white bands below: cone globose-ovoid, 2.5–5 cm. long. B.M. 2743(c). S.Z.2:t.104, 105(c). B.S.1:441,t.(h). (*C. sinensis* R. Br.) S. and W. China. Intr. 1804. Zone VIII.—Handsome tree of broad-pyramidal habit; it sprouts from the roots and the stump if cut back.

The second species is **C. Konishii** Hayata from Formosa with smaller and narrower lvs. and smaller cones. Intr. in 1918; tenderer.

12. **SCIADÓPITYS** Sieb. & Zucc. Umbrella-Pine. Evergreen tree with short and slender horizontally spreading brs. ascending at the ends; bark nearly smooth, separating in long thin shreds: lvs. of two kinds, small and scale-like, scattered on the shoots, crowded at the ends and bearing in their axils a whorl of 20–30 linear flat lvs. grooved on each side, more deeply beneath, and consisting each of two connate lvs. borne on undeveloped spurs like the fascicled pine lvs.: fls. monoecious; male fls. in dense clusters at the end of the brts., consisting of spirally arranged 2-celled anthers; female solitary, terminal, consisting of numerous spirally arranged scales bearing 7–9 ovules and subtended by a small bract: fr. an ovate-oblong cone with thick woody broadly orbicular scales, ripening the second season; seeds ovoid, compressed, narrowly winged; cotyledons 2. (Greek *skias*, *skiodos*, umbrella, and *pitys*, pine; alluding to the position of the lvs.) One species in Japan.

S. verticillàta Sieb. & Zucc. Tree to 40 m. with a trunk often 3 m. in girth and with a narrow-pyramidal head becoming thin in old age: lvs. linear, obtuse and emarginate, dark green and glossy above, with 2 white bands beneath, 8–12 cm. long: cone 8–12 cm. long; seeds 1.2 cm. long. S.Z.2;t.101,102 (c). B.M.8050(c). F.E.21:t.115(h). W.C.t.46, 47(h). C. Japan. Intr. 1861. Zone V.—Often planted in the E. States where it makes a handsome pyramidal dense tree, but it grows slowly.

13. **ARAUCÀRIA** Juss. Evergreen tall trees with regularly whorled spreading brs.: lvs. alternate, decurrent, radially spreading, rarely more or less 2-ranked, closely set, awl-shaped to ovate-lanceolate, rigid: fls. usually dioecious; the male terminal and fascicled, large, cylindric, with numerous stamens; the anthers with 8–15 pollen-sacs: female fls. terminal, ovoid or subglobose, consisting of numerous scales without bracts: fr. a subglobose or ovoid cone falling apart at maturity, with wedge-shaped 2-edged scales and with large seeds adnate to the scales; cotyledons 2–4. (Arauco, a province of s. Chile where the following species grows.) About 10 species in S. Am., Australasia and the Pacific Isls.

A. araucàna K. Koch. Monkey-Puzzle. . Tall tree to 30 m., with very stout spreading brs. in whorls of 5; brts. few, in opposite pairs, densely clothed with imbricate ovate-lanceolate, spiny pointed stiff lvs. slightly concave above, 2.5–5 cm. long, bright green on both sides, persisting for many years; male fls. 8–12 cm. long, cylindric: cone globose-ovoid, 14–20 cm. across; seeds oblong, slightly compressed, wingless, 2.5–3.5 cm. long; cotyledons 2, remaining below the soil. F.S.15:1577–80(c). G.C.III.21:288,t.(h); 24:154(h).

E.H.1:t.17–20(h). (*A. imbricata* Pav.) Chile. Intr. 1795. Zone VII.—A tree of striking appearance. The hardiest species of the genus and the only one which can be grown within our area.

14. **KETELEÈRIA** Carr. Evergreen trees with rough, irregularly furrowed bark and with spreading whorled brs., pyramidal while young, flat-topped in old age: buds ovoid or globose, not resinous: lvs. linear, rigid, flat or keeled and lustrous above, keeled and pale green below, on young trees usually spiny pointed, on old trees obtuse: fls. monoecious: male fls. clustered; anthers with 2 pollen-sacs: female fls. composed of numerous 2-ovuled scales subtended by small bracts: cone upright, ovoid to cylindric-oblong, with broad, woody, persistent scales, ripening the first year; bracts half as long as scale; seeds 2, their wings as long or nearly as long as the scales; cotyledons 2, remaining below ground. (After J. B. Keteleer, a French nurseryman, born in Belgium.) Two or 3 species in China.—Trees of the aspect of firs, but with the lvs. keeled or flat, not grooved above and pale green below. Better suited for a drier climate than the firs.

A. Young brts. glabrous, orange-red: lvs. spiny-pointed to obtusish: cone-scales suborbicular, slightly inflexed at apex ..... 1. *K. Fortunei*
AA. Young brts. puberulous or sometimes glabrous, yellowish gray: lvs. on old plants obtuse or emarginate: cone-scales ovate, recurved at apex ..... 2. *K. Davidiana*

1. **K. Fortùnei** Carr. Tall tree to 30 m.; lvs. linear, keeled on both sides, spiny pointed on young plants, obtusish on old trees, 2–3 cm. long: cone ovoid to ovoid-cylindric, 8–18 cm. long, purple while young. R.H.1887:207; 1904: 130. G.C.II.21:348. G.W.3:125(h). (*Abies Fortunei* Murr., *Abietia Fortunei* Kent.) S.E. China. Intr. about 1845. Zone VIII?

2. **K. Davidiàna** Beiss. Tree to 35 m.; bark dark gray: lvs. linear, keeled on both sides, on mature trees obtuse or emarginate, 2.5–5 cm. long: cone cylindric-oblong, 12–20 cm. long, greenish while young. G.C.III.33:84. R.H.1904:131. S.N.30(h). (*Abies D.* Franch., *Abies sacra* David.) W. China. Intr. 1888 and 1901. Zone VII or VIII. Probably hardier than the preceding species.

K. Evelyniana Mast. with smaller cones and oblong-ovate scales (G.C.III. 33:194) and *K. formosana* Hayata are probably varieties or synonyms of *K. Davidiana*.

15. **ÁBIES** Mill. Fir. Evergreen trees of pyramidal habit, with spreading whorled brs., bark usually smooth and thin on younger trees, often thick and furrowed on old trees; brts. smooth, or grooved in a few species; winter-buds usually resinous: lvs. spirally arranged, often spreading in 2 ranks, linear or linear-lanceolate, contracted above the base and leaving a circular scar as they fall, usually flattened and grooved above, in most species with 2 white stomatiferous bands below and without, rarely with stomata above, rarely 4-sided and with stomata on all 4 sides, with 2 or rarely 4 resin-ducts either internal (median) or marginal (external or subepidermal): fls. monoecious, axillary; male fls. pendent, oval to cylindric-oblong, with yellow or scarlet anthers: female fls. ovoid to oblong, consisting of numerous 2-ovuled imbricate scales: cone ovoid to oblong-cylindric with closely imbricated thin and leathery bracts incurved at the apex, narrowed at base into a long stipe and subtended by narrow exserted or enclosed bracts; the scales falling at maturity from the persistent axis; seeds ovoid or oblong with large thin wing; cotyledons 4–10. (The ancient Latin name of the Silver Fir.) About 36 species in the temperate regions of the n. hemisphere ranging on the higher mts. s. to Guatemala,

N. Afr. and the Himal.—The species of this genus are among the handsomest and stateliest Conifers; they succeed best in a cool and humid climate, but a few, particularly *A. concolor* will stand a drier climate.

The description of the lvs. in the key and in the account of the following species refers to those of sterile lateral brs.; the lvs. of fertile brs. and of leading shoots are as a rule shorter and thicker, usually acute or acutish and often spiny-pointed and more or less upturned or ascending: in some species the resin-ducts of the lvs. of fruiting brs. are internal, while those of the lvs. of sterile brs. are marginal.

A. Lvs. green and lustrous above, stomatiferous only below (occasionally with one or few short lines of stomata above near the apex in nos. 1 and 24).
  B. Brts. deeply grooved, particularly on 2-year-old brts.: cones purple or violet.
    C. Brts. glabrous: resin-ducts internal....14. *A. homolepis*
    CC. Brts. with brown pubescence in the grooves: resin-ducts marginal...15. *A. spectabilis*
  BB. Brts. not or slightly grooved.
    C. Lvs. without conspicuous white or glaucous bands below (in nos. 10 and 12 sometimes more conspicuous).
      D. Lvs. acutish to spiny-pointed.
        E. Lvs. of upper ranks partly recurved; cones violet-purple: buds very resinous. ....11. *A. recurvata*
        EE. Lvs. spreading at nearly right angles, pectinate: cone green: buds thinly resinous. ....13. *A. holophylla*
      DD. Lvs. emarginate or bifid.
        E. Lvs. more or less pectinate: buds slightly or not resinous: cones green.
          F. Brts. glabrous: lvs. emarginate....10. *A. chensiensis*
          FF. Brts. slightly grooved, hairy in the grooves: lvs. sharply 2-pointed, rigid, on old plants obtusish....12. *A. firma*
        EE. Lvs. above directed forward, slender, often curved; bifid at apex: buds resinous: cone purple....16. *A. pindrow*
    CC. Lvs. with 2 white or glaucous bands beneath.
      D. Brts. more or less pubescent.
        E. Winter-buds resinous.
          F. Lvs. more or less pectinate.
            G. Winter-buds very resinous.
              H. Lvs. 3–6 cm. long, distinctly pectinate: brts. soon glabrous ....27. *A. grandis*
              HH. Lvs. 1.5–2.5 cm. long, less distinctly pectinate....24. *A. balsamea*
            GG. Winter-buds slightly resinous: lvs. very white beneath, 1.5–2.5 cm. long, sharply bifid: brts. slightly grooved....6. *A. Faxoniana*
          FF. Lvs. not pectinate.
            G. Lvs. spreading upward and outward, 1.5–2.5 cm. long.
              H. Buds thinly resinous: brts. soon glabrous, yellowish: resin-ducts marginal ....4. *A. koreana*
              HH. Buds very resinous: brts. pubescent, brown or grayish.
                I. Bark of 6-year-old and older brts. flaky: resin-ducts internal. ....7. *A. squamata*
                II. Bark not flaky.
                  J. Brts. brown, densely pubescent: resin-ducts marginal..3. *A. Veitchii*
                  JJ. Brts. grayish: resin-ducts internal.
                    K. Lvs. with 8–12 lines of stomata in each band.....23. *A. Fraseri*
                    KK. Lvs. with 4–8 lines of stomata in each band....24. *A. balsamea*
            GG. Lvs. at least the upper ones directed forward.
              H. Lvs. about 1.5 mm. broad, up to 3 cm. long; resin-ducts internal.
                I. Brts. not grooved, minutely pubescent: lvs. with 4–5 lines of stomata in each band....1. *A. sibirica*
                II. Brts. slightly grooved, hairy in the grooves: each band with 7–8 lines of stomata....2. *A. sachalinensis*
              HH. Lvs. at least 2 mm. broad.
                I. Pubescence of brts. rufous, dense: lvs. 1–2 cm. long; resin-ducts internal....5. *A. Mariesii*
                II. Pubescence of brts. pale, short: lvs. 2–3 cm. long; resin-ducts marginal....6. *A. amabilis*
        EE. Winter-buds not resinous: resin-ducts marginal: cone green.
          F. Lvs. not pectinate.
            G. Lvs. spreading outward and upward: cone 16–20 cm. long, with hidden bracts....20. *A. cilicica*
            GG. Lvs. directed forward: cone 12–15 cm. long, with exserted bracts. ....21. *A. Nordmanniana*
          FF. Lvs. pectinate: bracts exserted....22. *A. alba*
      DD. Brts. glabrous (occasionally slightly hairy in nos. 8 and 9): lvs. crowded, spreading, with marginal resin-ducts.
        E. Lvs. obtuse or emarginate: cone purple or violet.
          F. Winter-buds resinous: lvs. 1.5–3 cm. long, emarginate.
            G. Lvs. not or scarcely revolute, 2–3 cm. long: resin-ducts internal on fruiting brs....8. *A. Fargesii*

GG. Lvs. revolute at margin, 1.5–2.5 cm. long.....9. *A. Delavayi*
FF. Winter-buds not resinous: lvs. usually obtuse, rarely acutish, stout, 1.5–2 cm. long.....17. *A. numidica*
EE. Lvs. sharply pointed.
F. Lvs. radially spreading, 2–3 cm. long.....19. *A. cephalonica*
FF. Lvs. pectinate, to 5 cm. long: buds large, pointed, not resinous: cone bristly. .....29. *A. venusta*
AA. Lvs. stomatiferous on both sides, grayish green or glaucous: buds resinous.
B. Lvs. radially spreading, pointed, short and rigid: resin-ducts internal....18. *A. pinsapo*
BB. Lvs. not radially spreading.
C. Lvs. flat: buds very resinous.
D. Brts. pubescent: resin-ducts internal: cone purple.....25. *A. lasiocarpa*
DD. Brts. glabrous: resin-ducts marginal: cone green or purple.....28. *A. concolor*
CC. Lvs. often 4-sided, blunt or acute, those in the middle of brts. curving upward from an adpressed base; resin-ducts marginal: buds slightly resinous, with free acuminate scales at base: cone purple, large.
D. Lvs. of sterile brs. flat or grooved above: bracts of cone exserted....30. *A. nobilis*
DD. Lvs. 4-sided: bracts hidden or somewhat exserted.....31. *A. magnifica*

1. **A. sibìrica** Ledeb. SIBERIAN F. Tree to 30 m.; bark smooth; buds globose; brts. gray, minutely pubescent: lvs. crowded above and directed forward, linear, slender, to 3 cm. long, rounded and entire or bifid at apex, shining bright green and grooved above, often with 2–3 short lines of stomata near apex, with 2 narrow grayish bands beneath: cones cylindric, 5–8 cm. long, bluish before maturity; scales about 1.5 cm. high with denticulate margin; bracts hidden, about half as long as scales. Forbes, Pin. Wob. t.39(c). C.B.2:27. S.N.73(h). Act. Hort. Berg. 6:t.86(h). (*A. pichta* Forb., *A. Semenovii* Fedtsch.) N. Russia to Kamtch., s. to Turkestan and Manch. Intr. 1820. Zone II.—Not satisfactory in the E. States; it demands a cool, moist climate and is apt to suffer from late frosts.

A closely related species is **A. nephrôlepis** Maxim. Bark of trunk rough: brts. more pubescent: lvs. shorter: cones smaller; scales about 1 cm. high, with narrower bracts about ⅔ as long as scales. Act. For. Fenn. 24:t.18(h). (*A. sibirica* var. *n.* Trautv., *A. gracilis* Komar.) E. Siberia, N. China. Intr. 1908.

2. **A. sachalinénsis** Mast. SAGHALIN F. Tree to 40 m.; bark smooth, gray; buds small; brts. slightly grooved, pubescent in the grooves: lvs. similar to those of *A. sibirica*, but slightly longer and broader, without stomata above and with 7–8 lines of stomata in each band below: cone greenish purple, cylindric, about 7 cm. long; scales with entire margin, densely pubescent on back; bracts exserted and reflexed. G.C.II.12:588. S.I.1:t.6(c). W.C.t.44, 45(h). (*A. Veitchii* var. *s.* F. Schmidt.) N. Japan, Saghal., Kurile Isls. Intr. 1878. Zone II or III.—Var. **nemorénsis** Mayr. Cones smaller, to 6 cm. long, with hidden bracts. Miyabe & Kudo, Ic. Ess. For. Hokk. t.4(c). (*A. Wilsonii* Miy. & Kudo.) Intr. 1914 to Am.

3. **A. Veìtchii** Lindl. VEITCH F. Tree to 25 m.; bark smooth, grayish; buds purplish, very resinous; brts. brown, rather densely pubescent: lvs. crowded, directed forward and partly upward, nearly pectinate below, linear, 1–2.5 cm. long, truncate and notched at apex, lustrous dark green above, beneath with 2 intensely white bands: cone cylindric, 4.5–6.5 cm. long, bluish purple while young; bracts slightly exserted and reflexed; seed with a broad wing scarcely as long as body. G.C.II.13:275. S.I.1:t.5(c). W.C.t.43(h). C. Japan. Intr. 1865. Zone III.—A desirable species, particularly handsome while young; thriving well in the E. States.—Var. **olivàcea** Shiras. Cone green while young, grayish brown when ripe. Act. Hort. Berg. 6, 4:t.1, f.9(c). Intr. 1914.—Var. **nikkoénsis** Mayr. Cone smaller, with scarcely visible bracts.

4. **A. koreàna** Wils. KOREAN F. Tree to 18 m.; bark of older trees rough; brts. sparingly pubescent, yellowish, becoming glabrous and purplish; buds thinly resinous: lvs. crowded, 1–2 cm. long, usually broader toward the apex

and rounded or emarginate, on young plants pointed, revolute at the margin, lustrous above, with whitish bands beneath: cone cylindric, 4–7 cm. long, about 2.5 cm. thick, violet-purple before maturity; scales about 2 cm. broad; bracts as long as scales, slightly exserted and recurved. G.C.III.69:77. S.N.149(h, as *A. holophylla*). Korea. Intr. 1908. Zone V.

5. **A. Marièsii** Mast. Maries F. Tree to 26 m.; bark smooth, pale gray, on old trees rough at base; buds small; brts. densely rusty-pubescent: lvs. crowded above, the middle ones directed forward and nearly appressed, the outer ones longer and spreading outward, linear, slightly broader above the middle, rounded or bifid at apex, 0.8–2 cm. long, shining green and grooved above, with 2 white bands below: cone ovoid or oblong-ovoid, 4–9 cm. long, violet-purple while young; scales about 2.5 cm. wide; bracts hidden; seed-wing twice as long as body. G.C.II.12:788; III.69:103. S.I.1;t.4(c). W.C.t. 40, 41(h). Japan. Intr. 1879. Zone V.—This tree does not do well in the E. States, though it is hardy.

6. **A. Faxoniàna** Rehd. & Wils. Faxon F. Tree to 40 m.; bark dark gray, furrowed: buds ovoid, purple, very resinous; brts. densely ferrugineous-pubescent, slightly grooved; lvs. crowded and irregularly spreading in 2 ranks, the upper shorter, linear, obtuse or emarginate, slightly revolute, 1.5–2.5 cm. long, shining dark green above, with 2 white bands below: cone ovoid-oblong, truncate at apex, 5–8 cm. long, violet-purple before maturity; scales 1.5–2 cm. wide; bracts somewhat exserted, upright or reflexed; seed-wings scarcely as long as body. W. China. Intr. 1911. Zone V?

7. **A. squamàta** Mast. Flaky F. Tree to 40 m.; bark purplish brown, exfoliating in thin flakes; buds subglobose, reddish brown, very resinous; brts. densely brownish pubescent: lvs. densely crowded and ascending, linear, 1.5–2.5 cm. long, obtuse or acutish, bluish green and grooved above, with 2 white bands below: cone oblong-ovoid, 5–6 cm. long, violet: scales about 1.5 cm.wide; bracts slightly exserted. G.C.III.39:299. W. China. Intr. 1910. Zone V?—Remarkable for its flaky bark, which begins to exfoliate on primary brs. when about 6 years old, the inner bark purplish red even on young brs.

8. **A. Fargèsii** Franch. Farges F. Tree to 35 m.; buds resinous; brts. glabrous, reddish brown or purplish, slightly grooved; lvs. pectinate below, crowded above, spreading at nearly right angles, the middle ones upright or sometimes reflexed, linear, sometimes falcate, emarginate or bifid at apex, 2–3 cm. long, dark green and grooved above, with 2 white bands beneath: cones ovoid-oblong, 5–8 cm. long, purple or red-brown; scales 1.5–2 cm. wide; bracts slightly exserted and recurved. Cent. China. Gn.88:167(h). S.N.142(h). Intr. 1901. Zone V.—One of the most satisfactory and promising of the Chinese firs.

The closely related **A. sutchuenénsis** Rehd. & Wils. (*A. Fargesii* var. *s.* Franch.) differs chiefly in its stouter and shorter ascending lvs. 1.5–2.5 cm. long, with distinct yellow petiole: cones 5–6 cm. long, with hidden bracts. W. China. Intr. 1911.

9. **A. Delavaỳi** Franch. Tree to 40 m.; bark gray, fissured in old trees; buds resinous; brts. usually glabrous, lustrous, red-brown, slightly grooved: lvs. crowded, scracely pectinate below, those above spreading at nearly right angles, the middle ones much smaller, nearly upright and often upturned, linear, emarginate at the apex, 1.5–2.5 cm. long, usually strongly revolute and acute at the margin, dark green and grooved above, with 2 white bands below; cones oblong-cylindric to oblong-ovoid, 6–7 cm. long, violet-black; scales about 2 cm. wide, entire; bracts slightly exserted. G.C.III.39:212, also

213 (as *A. Fargesii*). C.C.28. (*A. Faberi* Craib, *Ketcleeria Fabri* Mast.) W. China. Intr. 1901. Zone V?

Related species are: **A. Beissneriàna** Rehd. & Wils. Tree to 60 m.; bark dark gray; brts. yellowish, rarely slightly puberulous: lvs. crowded, spreading or ascending, 1.5–3 cm. long, plane above and sometimes stomatiferous near apex, with pale or glaucescent bands beneath: cone peduncled; bracts hidden. W. China. Intr. 1904. Zone VI or VII?—**A. Forréstii** Craib. Tree to 20 m.; brts. rusty-brown, minutely grooved, short-pilose: lvs. to 4 cm. long, rounded or emarginate, pectinate, ascending and forming a V-shaped groove, those of the lower ranks longer, to 4 cm. long, directed forward and upward or curving slightly backward and exposing the white under side, those on the upper side nearly upright and twisted at base: cone cylindric, 8–9 cm. long, violet-purple; bracts short-exserted. Notes Bot. Gard. Edinb. 11:t.162(h). W. China. Intr. about 1910.

10. **A. chensiénsis** Van Tiegh. Tree to 40 m.; buds ovoid, slightly resinous; brts. glabrous, yellowish gray, the older dark gray: lvs. horizontally spreading and more or less 2-ranked, linear, broader above the middle, 1.5–3.5 cm. long, usually rounded and emarginate at apex, rarely acutish, shining dark green above, with 2 grayish green or sometimes glaucescent bands beneath; resin-ducts marginal, on fruiting brs. internal: cones ovoid-oblong, 7–10 cm. long, green while young, finally cinnamon-brown; scales about 3 cm. broad, erose at margin and tomentose outside; bracts hidden. C. China. Intr. 1907. Zone V.

11. **A. recurvàta** Mast. Tree to 40 m., bark dark gray or reddish brown, rough; buds ovoid, very resinous; brts. glabrous, lustrous, pale yellowish gray; lvs. pectinate below and spreading, more or less recurved above, linear, 1.5–3.5 cm. long, acutish or sharply pointed, bright shining green or bluish green above, paler green beneath; resin-ducts marginal: cones oblong-ovoid, 5–10 cm. long, slightly resinous, violet-purple before maturity, finally grayish brown; scales 1.5 cm. broad; bracts hidden. B.J.48:642. W. China. Intr. 1910. Zone V.

12. **A. firma** Sieb. & Zucc. Momi F. Tree to 50 m., with broad-pyramidal head; bark soon scaly, fissured on old trees: buds small, slightly resinous; brts. brownish gray, slightly grooved, short-pubescent in the grooves: lvs. pectinate, firm, to 3.5 cm. long, broadest about the middle, sharply bifid at apex in young plants, obtuse and emarginate on older plants, with 2 grayish bands beneath; resin-ducts sometimes 4, 2 marginal and 2 internal: cones cylindric, 10–12 cm. long, yellowish green before maturity; scales about 2.5 cm. wide; bracts exserted, not reflexed. S.Z.2:t.107(c). P.I.26(c, h). S.N. 145(h). W.C.t.35, 36(h). (*A. momi* Sieb., *A. bifida* Sieb. & Zucc.) Japan. Intr. 1861. Zone (V) or VI.

13. **A. holophýlla** Maxim. Needle F. Tree to 30 m.; buds slightly resinous; brts. glabrous, slightly grooved, yellowish gray: lvs. pectinate below, spreading above at nearly right angles outward and upward, 2–4 cm. long, entire at apex, obtusish or acute, spiny-pointed in young plants, lustrous bright green above, with 2 pale or slightly whitish bands beneath; resin-ducts internal: cone cylindric, about 14 cm. long, light brown at maturity; scales 3–5 cm. wide, entire; bracts hidden. S.N.144(h, as *A. koreana*). Manch., Korea. Intr. 1905 to Am. Zone V.—Handsome fir doing well at the Arnold Arboretum.

14. **A. homólepis** Sieb. & Zucc. Nikko F. Tree to 30 m.; bark scaly; buds ovoid, resinous; brts. glabrous, grayish, deeply grooved, particularly on 2- and 3-year-old brs.: lvs. pectinate below, except a few small ones in the middle ranks, crowded above, spreading outward and upward and forming a V-shaped depression, the outer ones 2–3 cm. long, the middle ones shorter,

rounded and slightly bifid at apex, lustrous dark green above, with 2 broad white bands below: cones cylindric, slightly narrowed at base and apex, about 10 cm. long, purple before maturity: scales thin, 2 cm. wide, entire; bracts hidden. S.Z.2:t.108(c). S.I.1:t.3(c). B.E.t.25(h). W.C.t.37, 38(h). (*A. brachyphylla* Maxim.) Japan. Intr. 1861. Zone IV.—One of the most ornamental firs thriving well in the E. States.—Var. **tomòmi** Rehd. A more sparingly branched form with shorter lvs. (*A. tomomi* Bobbink & Atkins.)—Var. **umbellàta** Wils. Cone green while young. S.I.2:t.2(c). (*A. u.* Mayr, *A. umbilicata* Mayr.)

15. **A. spectàbilis** Spach. HIMALAYAN F. Tree to 50 m., with wide spreading brs. forming a broad-pyramidal head; bark scaly, rough; buds large, globose, resinous; brts. reddish brown, deeply grooved, pubescent in the grooves: lvs. arranged as in no. 14, but larger, 2.5–6 cm. long, rounded and bifid at apex, lustrous dark green above, with 2 broad white bands below: cones cylindric, 14–18 cm. long, violet-purple before maturity; scales 1.5–2 cm. broad; bracts hidden or slightly exserted. B.M.8098(c, as *A. Mariesii*). G.C.III.25:788. P.I.21(c,h). (*A. Webbiana* Lindl., *A. densa* Griff.) Himal., Sikkim and Bhotan. Intr. 1822. Zone VIII.—Var. **brevifòlia** Rehd. Lvs. shorter, not exceeding 3 cm., with grayish bands below; brts. less grooved; bark smooth. (*A. Webbiana* var. *brevifolia* Henry.) N.W. Himal. Zone VI or VII.

16. **A. píndrow** Spach. Tree to 60 m., with short brs. forming a narrow pyramid; bark smooth and gray on young trees, grayish brown on old trees; buds large, resinous; brts. smooth and glabrous, gray: lvs. nearly pectinate below, crowded above, those in the middle shorter and directed forward, narrowly linear, 3–6 cm. long, bifid and acute at apex (entire on young plants), lustrous dark green, with 2 gray bands below: cone cylindric, 10–14 cm. long, deep purple while young; scales 3 cm. wide; bracts hidden. P.I.22(c,h). C.B.2:23. (*A. Webbiana* var. *p.* Brandis.) Himal. Intr. 1837.—Hardier than the preceding species.

17. **A. numídica** De Lannoy. ALGERIAN F. Tree to 20 m.; bark gray, smooth, scaly and fissured on old trees; buds ovoid, large, not or slightly resinous; brts. glabrous and lustrous: lvs. pectinate below, much crowded above, spreading outward and upward, on stronger brts. backward, on weaker ones with a V-shaped depression in the middle, 1.5–2 cm. long, 2 mm. broad, often broadest above the middle, rounded at apex and bifid or entire, dark green above, often only faintly grooved and often stomatiferous near apex, with 2 white bands beneath: cones cylindric, 12–18 cm. long; scales 3 cm. wide, entire; bracts hidden. F.S.17:t.1717(c). P.I.20(c,h). B.E.t.26(h). (*A. pinsapo* var. *baborensis* Coss., *A. baborensis* Letourneux.) N. Afr. Intr. 1862. Zone VI or (V).

18. **A. pinsàpo** Boiss. SPANISH F. Tree to 25 m.; bark smooth, fissured on old trees; buds ovoid, resinous; brts. glabrous, brownish: lvs. spreading radially at nearly right angles, thick, rigid, 1.5–2 cm. long, acute or obtusish, dark green, slightly convex and stomatiferous above, with 2 pale bands beneath: cones cylindric, purplish brown, 10–12 cm. long; scales 2.5 cm. wide; entire; bracts small, hidden. P.I.19(c,h). G.C.III.3:140. E.H.4:t.212–3(h). Spain. Intr. 1837. Zone VI.—A handsome fir of striking appearance thriving well in the E. States.—Var. **argéntea** Beiss. With silvery white foliage.—Var. **glaùca** Beiss. With glaucous foliage.—Var. **péndula** Beiss. With pendulous brs. S.N.147(h). M.D.1913:337(h).

. *A. p.* × *cephalonica* = **A. Vilmorìnii** Mast. J.L.26:107. Vilmorin, Hort. Vilm. t.12(h). Raised in 1868.

A. p. × *Nordmanniana* = **A. insígnis** Carr. B.H.128(h),129. Raised in 1872. —Of this cross several forms are known: var. **Beissneriàna** Rehd. (*A. B.* Mottet); var. **Kentiàna** Rehd. (*A. K.* Mottet); var. **Mastersiàna** Rehd. (*A. M.* Mottet); var. **speciòsa** Rehd. (*A. Nordmanniana s.* Bailly).

19. **A. cephalónica** Loud. GREEK F. Tree to 30 m.; bark grayish brown, smooth, fissured on old trees; buds ovoid, reddish, resinous; brts. lustrous, red-brown, glabrous: lvs. radially spreading and slightly directed foward, the middle ones above shorter, 1.5–2.8 cm. long, stiff, gradually narrowed into a sharp point, shining deep green above, with 2 white bands beneath: cone cylindric, 12–16 cm. long and 4–5 cm. across, brownish; scales 3–3.5 cm. wide, undulate or entire; bracts exserted and reflexed. P.I.18(c,h). G.C.II.22:592. D.J.92, t(h). (*A. panachaica* Heldr., *A. Reginae Amaliae* Heldr.) Greece. Intr. 1824. Zone V.—Var. **Apóllinis** Beiss. Brts. yellowish: lvs. more crowded above, only a few below spreading downward and forward, thicker and broader, slightly acute or sometimes obtusish.—A handsome tree distinct in its spreading, sharply pointed lvs.

A. c. × *pinsapo* = *A. Vilmorinii*; see under No. 18.

Related species are: **A. Borísii règis** Mattf. Tall tree; brts. densely short-pubescent; buds resinous: lvs. to 3 cm. long, acute and subpungent, sometimes rounded or slightly emarginate: cones conical-cylindric, 15 cm. long; bracts exserted; scales 3–3.5 cm. wide. M.D.1925:t.1,f.7,t.4,5. Balkan Pen. Cult. 1883. Zone V.—**A. Bornmülleriàna** Mattf. Tall tree; brts. glabrous; buds resinous: lvs. to 3.5 cm. long, rounded or emarginate: cone 12 cm. long, cylindric; bracts exserted; scales 2.5–3 cm. wide. M.D.1925:t.2,f.9,t.6,7(h). Asia Minor. Intr.?

20. **A. cilícica** Carr. CILICIAN F. Tree to 30 m.; bark ashy gray, smooth, scaly on old trees; buds small, not or slightly resinous, with few keeled scales free at the tips; brts. grayish brown, with scattered short hairs: lvs. above spreading upward and forward, on weaker brts. outward and upward, leaving a V-shaped depression, slender, 2–3 cm. long, rounded or acute and slightly bifid at apex, shining bright green above, with 2 narrow whitish bands below: cones cylindric, 16–20 cm. long, reddish brown; scales 3.5–4 cm. wide, entire; bracts hidden. P.I.17(c,h). C.B.2:10. B.E.t.27(h). Asia Minor, Syria. Intr. 1855. Zone V.

21. **A. Nordmanniàna** Spach. NORDMANN F. Tree to 50 m.; bark grayish brown, slightly fissured on old trees; buds ovoid, acute, not resinous, with slightly keeled acute scales; brts. gray, with scattered short hairs: lvs. pectinate below, above directed forward and densely covering the brts., 2–3.5 cm. long, rounded and bifid at apex, lustrous dark green above, with 2 whitish bands beneath: cones cylindric, 12–15 cm. long, reddish brown; scales 3–4 cm. wide; bracts exserted and reflexed. B.M.6992(c). P.I.16(c,h). S.N.50, 137(h). Cauc., Asia Minor, Greece. Intr. 1848. Zone IV —Handsome and desirable fir.—Var. **aùrea** Beiss. Lvs. yellow.—Var. **tortifòlia** Rehd. Lvs. of the middle ranks above falcate and twisted.

A. N. × *pinsapo* = *A. insignis;* see under no. 18.

22. **A. alba** Mill. SILVER F. Tree to 50 m.; bark grayish, smooth, scaly on old trees; buds small, not resinous, with few obtuse scales; brts. gray, with scattered short hairs: lvs. pectinate, those of the upper ranks shorter and pointing outward and upward, 1.5–3 cm. long, rounded and bifid at apex, lustrous dark green above, with 2 white bands beneath: cones cylindric, 10–14 cm. long, green while young, finally reddish brown; scales 2.5–3 cm. wide, tomentose outside; bracts exserted and reflexed. H.W.1:87(h)–94,t.2(c). E.H.4:t.208–11(h). (*A. pectinata* DC., *A. Picea* Lindl., not Mill.) Mts. of C. and S. Eu. Long cult. Zone IV.—Var. **compácta** Rehd. A dwarf compact bushy form with ascending crowded brs. and lustrous lvs. about 1.5 cm. long.

—Var. **péndula** Aschers. & Graebn. With pendulous brs. G.W.19:466(h). (*A. pectinata p.* Carr.)—Var. **pyramidàlis** Voss. With ascending brs. forming a columnar head. (*A. pectinata p.* Carr., *A. alba* l. *fastigiata* Aschers. & Graebn.)—Var. **columnàris** Rehd. With short spreading brs. of nearly equal length forming a columnar head. (*A. pectinata c.* Carr.)—This species is not doing well in the E. States.

23. **A. Fràseri** Poir. Southern Balsam F. Tree to 25 m.; bark smooth, reddish and scaly on old trees: buds small, subglobose, very resinous; brts. yellowish gray, densely covered with short reddish hairs: lvs. spreading upward and forward, pectinate below, 1.5–2.5 cm. long, rounded and bifid at apex, lustrous dark green above, with 2 broad white bands beneath: cones oblong-ovoid or ovoid, 3.5–6 cm. long, purple before maturity; scales 2 cm. wide; bracts exserted and reflexed. S.S.12:t.609. G.C.III.8:684. G.F.2:475 (h). Alleghany Mts., W. Va. to N. C. and Tenn. Intr. 1811. Zone IV.

24. **A. balsámea** Mill. Balsam F. Tree to 25 m.; bark grayish brown, scaly on old trees: buds reddish, very resinous: brts. ashy gray, short-pubescent: lvs. spreading upward, pectinate below, on weaker brts. pectinate, 1.5–2.5 cm. long, rounded and slightly bifid at apex, dark green above and often with a few stomatic lines near apex, with 2 narrow whitish bands beneath: cones oblong, 5–7 cm. long, violet-purple before maturity; scales 1.5 cm. wide; bracts enclosed or sometimes exserted (var. **phanerólepis** Fern.). S.S.12:t.610. G.C.III.17:422. Act. Hort. Berg. 6:t.87(h). Lab. to W. Va., w. to Minn. and Iowa. Intr. 1698. Zone III.—In the E. States not satisfactory outside of its natural habitat.—Var. **hudsónia** Sarg. Dwarf form with dark green shorter and broader lvs. (Var. *hudsonica* Kent, *A. h.* Bosc.) Intr. before 1810.—Var. **macrocárpa** Kent. Lvs. longer and cones to 8.5 cm. long. Intr. from Wisc. about 1884. It forms a transition to the following species.

25. **A. lasiocárpa** Nutt. Rocky Mountain F. Tree to 30 or occasionally to 50 m.; bark smooth and silvery gray, fissured on old trees; buds small, ovoid, resinous; brts. ashy gray, with short rufous pubescence: lvs. much crowded above and directed forward and upward, 2.5–4 cm. long, rounded or acutish at apex, rarely emarginate, pale bluish green, stomatiferous and slightly grooved above, with 2 broad pale bands beneath: cones oblong-cylindric, 6–10 cm. long, truncate or depressed at apex; scales 2–2.5 cm. wide; bracts hidden. S.S.12:t.611. G.F.4:382(h). (*A. subalpina* Engelm.). Alaska to Ore., Utah, and n. N. Mex. Intr. 1863.—Var. **compácta** Rehd. A dwarf compact form (*A. subalpina c.* Beissn.). Orig. 1873.—Var. **arizónica** Lemm. Arizona F. Bark creamy white, thick and corky; lvs. whiter beneath and emarginate at the apex, more distinctly pectinate. S.N.154(h). M.G.40: 289(h). (*A. a.* Merriam.) N. Ariz. and n. N. Mex. Intr. 1901.—This species does not thrive well in the E. States.

26. **A. amàbilis** Forb. Tree to 80 m.; bark silvery white or pale, at the base of old trees thick and furrowed; buds globose, very resinous; brts. gray, densely pubescent: lvs. pectinate below, crowded above, the lower ranks spreading, the upper stouter and directed forward, linear, 2–3 cm. long, often broadest above the middle, truncate or bifid at the apex, shining dark green above and grooved, with 2 broad white bands below: cones oblong, 8–14 cm. long, purple before maturity, puberulous; scales 2.5–2.8 cm. wide; bracts hidden. S.S.12,t.614. G.C.III.3:754. D.J.80,t(h). B. C. and Alb. to Ore. Intr. 1830. Zone V.

27. **A. grandis** Lindl. Giant F. Tree to 100 m. tall and to 5 m. in girth;

buds ovoid, resinous; brts. olive-green, minutely pubescent: lvs. pectinate, linear, 3–6 cm. long and 2–2.5 mm. wide, flexible, rounded and bifid at the apex, shining dark green and grooved above, with 2 white bands below: cones cylindric, 5–10 cm. long, bright green; scales 2.5–3 cm. wide; bracts hidden. S.S.12:t.612. B.C.2:14. E.H.4:t.217–8(h). (*A. Gordoniana* Carr., *A. amabilis* Murr., not Forbes.) Vancouver Isl. to N. Calif., east to Mont. Intr. 1831. Zone VI.

28. **A. cóncolor** Lindl. & Gord. Colorado F. Tree to 40 m.; bark smooth, gray, on old trees deeply fissured and scaly; buds globose, resinous; brts. yellowish green, minutely pubescent or nearly glabrous: lvs. irregularly arranged, mostly spreading outward and curving upward, some of the middle ranks above directed forward, linear, 4–6 cm. long, acute or rounded at apex, bluish green, slightly convex and stomatiferous above, convex below and with two pale bands: cones cylindric, 7–12 cm. long, narrowed at the ends, greenish or purplish before maturity; scales about 2.5 cm. wide, bracts hidden. P.I.29(c,h). S.S.12:t.613(partly). G.C.III.8:748. W.A.82,t(h). Colo. to s. Calif., n. Mex. and N. Mex. Intr. 1872. Zone IV.—Var. **violàcea** Beiss. Lvs. bluish white.—Var. **Wattèzii** Beiss. Lvs. first pale yellowish, changing to silvery white.—Var. **aùrea** Beiss. Young lvs. golden yellow.—Var. **brevifòlia** Beiss. Lvs. short and thick, obtuse, twice as broad as in the type.—Var. **globòsa** Beiss. Of globose habit, with short brs.—Var. **Lowiàna** Lemm. Tree to 80 m.; buds smaller; lvs. more pectinately arranged, 5–7 cm. long, rounded and bifid at the apex, shallowly grooved above. P.I.30(c,h). C.B.2:16. G.C. III.13:8. S.N.146(h). (*A. Lowiana* Murr., *A. Parsonsiana* Barron, *A. concolor* var. *lasiocarpa* Engelm. & Sarg., *A. lasiocarpa* Mast., not Nutt.) Ore. to Calif. Intr. 1851. Zone VI.—This species is one of the best firs for the E. States; the var. *Lowiana* is less satisfactory.

29. **A. venústa** K. Koch. Tree to 50 m., the lower brs. pendulous, the upper short, forming a head abruptly narrowed from a broad pyramidal base into a slender spire; bark smooth, brown, fissured at the base of old trees; buds elongated, acute, 1.5–2.5 cm. long, not resinous; brts. greenish, glabrous: lvs. pectinate, linear to linear-lanceolate, 3–6 cm. long, rigid, spiny-pointed, shining dark green above, not grooved, with 2 broad white bands below: cones ovoid, 7–10 cm. long, purplish brown, resinous, with the exserted bracts ending in rigid spines 2.5–5 cm. long, giving the cone a bristly appearance. S.S.12:t.615,616. E.H.4:t.224(h). (*A. bracteata* Nutt.) Calif. Intr. 1853. Zone VIII?

30. **A. nòbilis** Lindl. Noble F. Tree to 80 m., with a girth to 8 m.; bark on old trees reddish brown and deeply fissured; buds resinous above; brts. minutely rusty-pubescent: lvs. pectinate below, crowded above, the lower ranks spreading outward, those of the middle ranks much shorter, appressed to the brts. near the base, then curving upward, linear, 2.5–3.5 cm. long, 1.5 mm. wide, rounded and entire or slightly notched at the apex, bluish green, stomatiferous and grooved above, with 2 narrow pale bands below: cone cylindric-oblong, slightly narrowed toward the apex, 14–25 cm. long, green before maturity, finally purplish brown; scales 3–3.5 cm. broad; bracts much exserted and reflexed. S.S.12:t.617. G.C.II.25;652. E.H.4,t.225(h). Wash. to N. Calif. Intr. 1830. Zone (V).—Var. **glauca** Beiss. With glaucous lvs.—This fir thrives well in the E. States.

31. **A. magnífica,** Murr. Red F. Tree to 70 m. and to 10 m. in girth; buds and brts. like those of the preceding species: lvs. less crowded, longer, up to 4 cm. long, quadrangular in section, rounded and entire at apex, keeled

and stomatiferous above, with 2 pale bands below: cones cylindric-oblong, 14-22 cm. long, pubescent, purplish violet before maturity; scales 3–3.5 cm. wide; bracts hidden. S.S.12:t.618,619. G.C.II.24:652. E.H.4:t.222–3(h). (*A. nobilis* var. *m.* Kellogg.) Ore. to Calif. Intr. 1851. Zone V.—Var. **glauca** Beiss. With deep glaucous lvs.—Var. **argéntea** Beiss. With bluish white lvs. —Var. **shasténsis** Lemm. Bracts exserted and usually reflexed, covering nearly half the scales. S.S.12:t.620. G.C.II.24:652;III.41:114. (*A. s.* Lemm.) Ore. to Calif.—A handsome fir of regular habit doing well in the E. States but less hardy than the preceding species.

16. **PSEUDOTSÙGA** Carr. Evergreen trees with irregularly whorled brs.; brts. nearly smooth, marked with oval scars after the lvs. have fallen: buds ovate, acute, glabrous, not resinous: lvs. spirally arranged, spreading into 2 opposite rows, linear, flattened, green and grooved above, with 2 stomatic bands below, and with 2 marginal resin-ducts and 1 vascular bundle: fls. monoecious, solitary; male fls. axillary, cylindric; female terminal on short brts. and consisting of numerous spirally arranged 2-ovuled scales: fr. a pendulous, ovoid to ovoid-oblong cone with rounded concave rigid scales subtended by exserted bracts 3-lobed at the apex with the middle lobe long and narrow; seeds 2 under each scale, winged; cotyledons 6–12. (Greek *pseudos*, false, and *tsuga*; alluding to its relationship.) Four species in W. N. Am. and in E. Asia.

A. Lvs. entire at apex: 2-year-old brts. reddish brown, usually pubescent....1. *P. taxifolia*
AA. Lvs. emarginate: brts. pale yellowish gray, glabrous.....2. *P. japonica*

1. **P. taxifòlia** Brit. Douglas-Fir. Tree to 100 m.; trunk to 12 m. in girth; bark smooth, on old trees thick and corky, deeply fissured into scaly ridges; brts. pubescent, rarely glabrous, pale orange at first, changing to reddish brown and later to grayish brown: lvs. straight, rarely curved, 2–3 cm. long, obtuse or rarely acutish, dark or bluish green above, with 2 grayish or whitish bands beneath: cone ovoid, 5–10 cm. long; scales slightly concave, about 2 cm. wide; bracts exserted, upright or sometimes reflexed, green while young, light brown at maturity. S.S.12:t.607, E.H.4:t.227–31(h). (*P. Douglasii* Carr., *P. mucronata* Sudw., *Abies Douglasii* Lindl., *Abietia Douglasii* Kent.) B. C. to Calif., Mont., Colo., N. Mex. and w. Tex. Intr. 1827. Zone IV.—The typical form of the coast region has been distinguished as var. **víridis** Aschers. & Graebn. (*P. Douglasii* subsp. *mucronata* Schwerin.) It is a taller tree, with the young brs. spreading, larger green lvs., larger cones with upright and accumbent bracts. Here belong the following forms: Var. **caèsia** Aschers. & Graebn. Lvs. bluish green.—Var. **fastigiàta** Sudw. A pyramidal form with upright brs.—Var. **péndula** Sudw. Form with pendulous brs.—Var. **glauca** Schneid. is the Rocky Mountain form. Tree of slower growth and more compact habit, with ascending young brs.: lvs. shorter and more or less bluish green: cone about 5 cm. long, with spreading or finally reflexed bracts. (*P. g.* Mayr, *P. Douglasii* var. *g.* Mayr, *P. Douglasii* subsp. *glaucescens* Schwerin.)—To this var. belong the following forms: Var. **argéntea** Sudw. Lvs. bluish white. (*P. D. a.* Koster.)—Var. **"glaùca péndula"** Schneid. With pendulous brs. and bluish green lvs. (*P. D. g. p.* Rueppell.) —Var. **compácta** Sudw. Compact form with short crowded lvs. (*P. D. c.* Carr.)—Var. **globòsa** Aschers. & Graebn. Dwarf globose form. (*P. D. g.* Lutz.)—The Rocky Mountain form is doing well in the E. States and forms a handsome dense pyramidal tree, but is of slower growth than the tenderer typical form which on account of its more rapid growth and larger size is more valuable as a timber tree.

2. **P. japónica** Beiss. Tree to 30 m.; bark fissured, dull reddish brown, becoming grayish brown; brts. glabrous, pale yellowish gray, with a conspicuous dark brown line around the apex of the pulvini: lvs. directed more or less forward, linear, often slightly curved, emarginate, 1.5–2.5 cm. long, shining bright green above and grooved, with 2 whitish bands below: cone ovoid, 4–5 cm. long, dark violet while young; scales very concave, rigid, 2–3 cm. wide; bracts exserted and reflexed. S.I.2:t.7(c) C.B.1:59. G.C.III.76:337. W.C.t.33,34(h). (*Tsuga j.* Shiras.) Japan. Intr. 1898. Zone VI.

A closely related species is **P. sinênsis** Dode from W. China which differs chiefly in the pubescent brown brts., longer lvs., to 3 cm. long and more distinctly pectinately arranged, larger cones, about 6 cm. long, with puberulous scales and upright or reflexed bracts. Intr. about 1914.—*P. Wilsoniana* Hayata (*P. Forrestii* Craib) from Formosa and S.W. China is probably not hardy within our area.

17. **TSÙGA** Carr. HEMLOCK-SPRUCE. Evergreen trees with deeply furrowed bark and horizontal, often pendulous brs. irregularly ramified; brts. with prominent leaf-cushions; buds globose or ovoid, not resinous: lvs. spirally arranged, usually more or less 2-ranked, linear, usually flattened and grooved above and with 2 white stomatic bands below, rarely rounded above and stomatiferous on both sides, with one resin-canal below the vascular bundle: fls. solitary; male fls. globose, axillary, the female terminal on lateral shoots with imbricated 2-ovuled scales: fr. a usually small cone consisting of concave woody scales subtended by small rarely exserted bracts and persisting after the escape of the seeds; seeds 2 under each scale, small, winged; cotyledons 3–6. (Tsuga is the vernacular Japanese name.) About 10 species in temp. N. Am., Japan, China and Himal.

A. Lvs. flat, grooved above, with 2 white or pale bands below, pectinately arranged: cones small, 1.5–3 cm. long.
  B. Margin of lvs. entire.
    C. Brts. glabrous, grayish or yellowish brown: lvs. 8–25 mm. long, notched. 1. *T. Sieboldii*
    CC. Brts. pubescent.
      D. Lvs. 8–14 mm. long, notched; brts. pubescent throughout, reddish brown. 2. *T. diversifolia*
      DD. Lvs. 8–25 mm. long; brts. light yellowish brown or gray, pubescent chiefly in the grooves.
        E. Lvs. notched at the apex, with inconspicuous bands below: cone-scales suborbicular. 3. *T. chinensis*
        EE. Lvs. entire or obscurely notched at the apex, with conspicuous white bands: cone-scales oval-oblong. 4. *T. caroliniana*
  BB. Margin of lvs. serrulate: brts. pubescent.
    C. Lvs. beneath with well defined narrow bands and a distinct green margin: buds ovoid, pointed. 5. *T. canadensis*
    CC. Lvs. beneath with broad ill defined bands and indistinct green margin: buds globose. 6. *T. heterophylla*
AA. Lvs. rounded or keeled above, stomatiferous on both sides: cones cylindric-oblong, 5–7 cm. long. 7. *T. Mertensiana*

1. **T. Sieból̀dii** Carr. Tree to 30 m., with horizontally spreading brs. forming an oval head, in cult. usually small tree or shrub; buds ovoid, acutish, with glabrous ciliate scales: lvs. linear, 6–22 mm. long, to 3 mm. broad, emarginate at apex, glossy dark green above, with 2 narrow white bands below: cone ovoid, 2–2.5 cm. long, stalked, with orbicular scales. S.Z.2:t.106(c). S.I.2:t.4(c). W.C.29,30(h). S.N.100,297(h). (*T. araragi* Koehne.) Japan. Intr. 1850. Zone (V).

2. **T. diversifòlia** Mast. JAPANESE H. Tree, rarely to 30 m., with horizontal brs. forming a pyramidal head; buds obovoid, flattened, minutely pubescent and ciliate: lvs. crowded, linear-oblong, 5–15 mm. long, 2.4 mm. broad, emarginate at apex, very glossy and dark green above, with narrow

white bands below: cones subsessile, ovoid, 2 cm. long; scales orbicular-ovate, lustrous, withs lightly thickened bevelled margin. S.I.2:t.4(c). W.C.31,32(h). S.N.298(h). (*T. Sieboldii* var. *nana* Carr.) Japan. Intr. 1861. Zone V.—Graceful and distinct species doing well in the E. States and hardier than the preceding species.

3. **T. chinénsis** Pritz. CHINESE H. Tree to 50 m.; buds ovoid, obtuse, glabrous; brts. yellowish, later pale yellowish gray, hairy only in the grooves: lvs. linear, 1.5–2.5 cm. long, 2–3 mm. broad, emarginate, glossy dark green and slightly grooved above, with broad whitish bands beneath becoming inconspicuous: cones ovoid, 1.5–2.5 cm. long; scales suborbicular, lustrous yellowish brown, with slightly bevelled margin. C.C.21. Not. Bot. Gard. Edinb. 14:t.194,f.1. W. China. Intr. 1901. Zone (V).—Handsome promising species.

The closely related **T. yunnanénsis** Mast. differs chiefly in the more densely pubescent brts., shorter and narrower, obtuse, not emarginate lvs. 7–18 mm. long, deeply grooved above, always very white below, and in the dull cones with fewer scales slightly recurved at apex. Not. Bot. Gard. Edinb. 14:t.194,f.5. W. China. Intr. 1908. Zone VI?

4. **T. caroliniàna** Engelm. CAROLINA H. Tree, occasionally to 25 m., with often pendulous brs. forming a compact pyramidal head; buds obtuse, pubescent; brts. orange-brown, slightly pubescent; lvs. linear, 8–18 mm. long, emarginate, lustrous dark green above, with white bands beneath: cones short-stalked, ovoid-oblong, 2–3.5 cm. long; scales oblong-ovate, rounded, thin, puberulous outside. S.S.10:t.604. G.C.II.26:780. B.E.t.31(h). W.A. 78,t(h). Mts. of S. W. Va. to Ga. Intr. 1881. Zone V.—A very desirable ornamental tree of more compact habit and handsomer than the common H.—Var. **compácta** Hornibrook. is a slow-growing round-topped and denser form. H.W.186,t(h).

5. **T. canadénsis** Carr. COMMON H. Tree, occasionally to 30 m., with long and slender often pendulous brs. forming a broad pyramidal head; buds obtuse, slightly puberulous; brts. yellow-brown, pubescent: lvs. linear, 8–18 mm. long, rounded, rarely emarginate at apex, lustrous dark green and slightly grooved above, with narrow white bands beneath: cones short-stalked, ovoid, 1.5–2 cm. long, with roundish obovate scales. S.S.10:t.603. G.C.III.48: 350–1(h). E.H.2:t.70–1(h). (*T. americana* Farwell.) N. S. to Minn. and Ill., s. on the mts. to n. Ga. and n. Ala. Intr. about 1736. Zone IV.—Handsome ornamental tree; also timber-tree of some importance and bark used for tanning.—Var. **albo-spìca** Beiss. Tips of young shoots white.—Var. **microphýlla** Sénécl. Lvs. 3–5 mm. long and 1 mm. broad. (Var. *parvifolia* Beiss.) —Var. **compácta** Sénécl. Dwarf conical form with short brs. and short lvs. B.E.t.32(h).—Var. **grácilis** Carr. Slow growing form with spreading sparingly ramified brs. drooping at the ends: lvs. 6–8 mm. long.—Var. **péndula** Beiss. Low form with pendulous brs. forming a dense hemispherical bush broader than high. M.G.15:367–8,491(h). Gn.39:81(h). G.C.III.75:107(h). (Var. *Sargentiana* Kent, var. *Sargenti pendula* Hort.)

6. **T. heterophýlla** Sarg. WESTERN H. Tree to 70 m., with short usually pendulous brs. forming a narrow-pyramidal head; buds ovoid; brts. yellow-brown changing to dark red-brown, pubescent for 5 or 6 years and with long pale hairs while young: lvs. linear, 6–18 mm. long, rounded at apex, shining dark green and grooved above, with broad white bands beneath: cone sessile, 2–2.5 cm. long; scales obovate, longer than broad, puberulous outside. S.S. 10:t.605. G.C.III.12:11. B.S.2:604,t(h). D.J.t.29(h). (*T. Mertensiana* Carr., *T. Albertiana* Sénécl.) S. Alaska to Idaho and Calif. Intr. 1851. Zone

VI.—Handsome tree of rapid growth in rich humid soil, but not doing well in the dry climate of the E. States.

A related species is **T. dumōsa** Sarg. Tree to 40 m.; buds globose, pubescent: lvs. 1.5–3 cm. long, tapering to an acute apex, silvery white below, with scarcely any green margin: cone-scales suborbicular, striate. G.C.II.26:72,500. E.H.2:t.72 (h). (*T. Brunoniana* Carr.) Himal. Intr. 1838. Zone VIII?

7. T. Mertensiàna Sarg. MOUNTAIN H. Tree to 30 or occasionally to 50 m., with slender pendent brs. forming an open pyramidal head; buds ovoid, acute; brts. reddish brown, pubescent for 2 or 3 years: lvs. radially spreading, 5–25 mm. long, bluntly pointed, usually bluish green, rounded above, rarely slightly grooved, stomatiferous on both sides: cones sessile, cylindric-oblong, 3–7.5 cm. long; scales suborbicular, thin, puberulous outside, usually bluish purple before maturity. S.S.10:t.606. G.C.III.21:150–1. G.F.10:6,7(h). E.H.2:t.67(h). (*T. Hookeriana* Carr., *T. Pattoniana* Sénécl., *Hesperopeuce Pattoniana* Lemm.) S. Alaska to n. Mont., Idaho and Calif. Intr. 1854. Zone (V).—Var. **argéntea** Sudw. Lvs. bluish white. S.N.302(h).—To avoid confusion one has to bear in mind that *T. heterophylla* was known for a long time as *T. Mertensiana* and is still not infrequently called so.

T. M. × *heterophylla* = **T. Jéffreyi** Henry. Buds ovoid, acute: lvs. radially spreading and directed outward, green and grooved above, with stomata near apex, minutely serrulate. (*T. Mertensiana* var. *Jeffreyi* Schneid.) Intr. 1851.

18. PÍCEA A. Dietr. SPRUCE. Evergreen pyramidal trees with scaly bark and whorled brs.; brts. with prominent leaf-cushions (pulvini) separated by incised grooves and produced at the apex into a peg-like stalk bearing the leaf; buds ovoid or conical, with imbricated scales, with or without resin: lvs. spirally arranged, on the under side of the brts. usually pectinately arranged, linear, usually 4-angled and stomatiferous on all 4 sides or compressed and stomatiferous only on the upper (ventral or inner) side which appears by twisting of the lvs. to be the lower one; with 2 marginal resin-ducts, rarely without: fls. monoecious, catkin-like, solitary: male fls. axillary, yellow or red, consisting of numerous spirally arranged anthers with 2 pollen-sacs; female fls. terminal, green or purple, consisting of numerous 2-ovuled bracted scales: fr. an ovoid to oblong-cylindric pendulous or sometimes spreading to nearly upright cone, with persistent, suborbicular to rhombic-oblong scales subtended by small bracts; seeds 2 under each scale, small, compressed, winged. (The ancient Latin name, derived from *pix*, pitch.) Thirty-nine species in the cooler and temperate regions of the n. hemisphere, from the arctic circle to the high mts. of the warm-temp. regions.

A. Lvs. quadrangular or slightly compressed, stomatiferous on all sides.
  B. Lvs. nearly equally stomatiferous on all 4 sides, in cross-section about as high as broad or higher than broad.
    C. Brts. glabrous (sometimes pubescent in no. 10 and in a var. of no. 19).
      D. Lvs at least of the upper ranks more or less pointing forward.
        E. Brts. gray or yellowish to orange.
          F. Lvs. radially spreading, 2–4 cm. long: brts. usually pendulous.
            G. Winter-buds pointed: lvs. 2.5–4 cm. long, gradually pointed. 1. *P. Smithiana*
            GG. Winter-buds obtuse: lvs. 2–3 cm. long, rather abruptly pointed. 2. *P. Schrenkiana*
          FF. Lvs. pectinately arranged below: brts. not pendulous: buds acute or acutish.
            G. Brts. pale gray or yellowish.
              H. Lvs. 1–2 cm. long: brts. yellowish, with short petioles. 3. *P. Watsoniana*
              HH. Lvs. 8–15 mm. long: brts. pale gray, with scarcely raised petioles. 4. *P. Wilsonii*
            GG. Brts. bright yellow to orange; petioles about 1 mm. long. 5. *P. aurantiaca*
        EE. Brts. brown or yellowish brown (sometimes pale in no. 10).
          F. Cone 10–15 cm. long: lvs. dark or bright green, often spiny-pointed, usually 1–2 cm. long.
            G. Winter-buds resinous, their scales all obtuse, glabrous, revolute at apex. 8. *P. heterolepis*

GG. Winter-buds not resinous, the terminal one with a few acuminate ciliate scales at base.....10. *P. Abies*
FF. Cones 3–6 cm. long: lvs. usually glaucous, obtusish or acutish: bud-scales rounded, usually emarginate and revolute at apex.....19. *P. glauca*
DD. Lvs. more or less radially spreading at nearly right angles.
E. Winter-buds very resinous: lvs. 8–15 mm. long.....6. *P. Maximowiczii*
EE. Winter-buds not or slightly resinous: lvs. up to 2.5 cm. long.
F. Bud-scales firmly appressed, dark brown; lvs. in cross-section higher than broad.....7. *P. polita*
FF. Bud-scales revolute at apex, light yellow-brown: lvs. as high as broad: cone with loosely appressed scales.....21. *P. pungens*
CC. Brts. pubescent (leading shoot glabrous in no. 14).
D. Terminal winter-buds without subulate scales at base.
E. Brts. yellowish to grayish.
F. Lvs. 1–1.8 cm. long: cones with obovate entire stiff scales.
G. Cone 8–12 cm. long: lvs. slender, slightly pungent, straight..9. *P. asperata*
GG. Cones 6–7 cm. long: lvs. stout, not pungent, usually curved.
13. *P. Meyeri*
FF. Lvs. 1.5–2.5 cm. long, often glaucous: cone to 7 cm. long, with rhombic erose flexible scales.....20. *P. Engelmanni*
EE. Brts. brown: lvs. dark green: cone-scales entire, stiff.
F. Lvs. pointed, 8–20 mm. long, spreading.
G. Leading shoot glabrous or nearly so: lvs. with more numerous stomata above than beneath.....14. *P. Koyamai*
GG. Leading shoot like other brts. pubescent: lvs. equally stomatiferous on all sides.....11. *P. obovata*
FF. Lvs. obtuse, 6–12 mm. long, more or less appressed, dark green, very lustrous.
12. *P. orientalis*
DD. Terminal winter-bud with a ring of conspicuous subulate scales at base: lvs. often with more stomata above than beneath.
E. Pubescence of brts. glandular: cones 1.5–5 cm. long.
F. Lvs. lustrous green: cones green when young, falling soon after maturity.
16. *P. rubra*
FF. Lvs. glaucous or dull bluish green: cones purple when young, persisting for several years.....17. *P. mariana*
EE. Pubescence of brts. not glandular: cone 5–7 cm. long.....18. *P. Glehnii*
BB. Lvs. in cross-section broader than high, with at least twice as many stomatic lines above as below (see also nos. 16–18).
C. Lvs. with about twice as many stomata above as below, slightly compressed.
D. Brts. at least partly glabrous; bud-scales not acuminate: cone-scales stiff, entire.
E. Leading shoot glabrous, the lateral brts. pubescent: lvs. 1–1.5 cm. long.
14. *P. Koyamai*
EE. Leading shoot pubescent, lateral brts. glabrous: lvs. 1–2 cm. long...15. *P. bicolor*
DD. Brts. all pubescent: lower bud-scales long-acuminate and keeled: cone-scales denticulate, thin.....22. *P. montigena*
CC. Lvs. with only 1–4, often broken rows of stomata on each side beneath, with conspicuous stomatic bands above, compressed: cone-scales thin, denticulate.
D. Lvs. beneath with stomatic bands of 1–4 rows each: cone with rhombic-ovate scales, brown or slightly purplish.....23. *P. Balfouriana*
DD. Lvs. beneath with usually only 2 incomplete rows of stomata: cone with rhombic-oblong scales, purple.....24. *P. purpurea*
AA. Lvs. flattened, with white bands above and without or occasionally with only a broken row of stomata beneath.
B. Lvs. not radially spreading, more or less pectinate below: brts. short, not or slightly pendent.
C. Brts. glabrous: cone-scales flexible, thin, erose-denticulate.
D. Lvs. not pungent, though often pointed,1–2 cm. long.....25. *P. jezoensis*
DD. Lvs. pungent, 1.5–2.5 cm. long.....26. *P. sitchensis*
CC. Brts. pubescent or the leading shoots glabrous: cone-scales stiff, appressed before maturity.
D. Brts. yellow to orange-brown, the leading shoots usually glabrescent: winter-buds dark brown, without subulate scales at base: lvs. above usually without distinct green midrib.
E. Cone-scales obovate or orbicular-obovate.
F. Lvs. acute, to 3 cm. long and 1–1.5 mm. broad.....27. *P. brachytyla*
FF. Lvs. obtuse or acutish, 1–1.5 cm. long and 1.5–2 mm. broad.
28. *P. Sargentiana*
EE. Cone-scales rhombic, narrowed toward the truncate erose apex: lvs. 1–1.8 cm. long and 1 mm. broad.....29. *P. ascendens*
DD. Brts. brown, all pubescent: winter-buds with subulate scales at base: lvs. above with distinct green midrib.....30. *P. omorika*
BB. Lvs. more or less radially spreading: brts. long and pendulous.
C. Brts. pubescent: lvs. obtuse or obtusish.....31. *P. Breweriana*
CC. Brts. glabrous: lvs. pungent.....32. *P. spinulosa*

Sect. I. Eupicea Willk. Lvs. quadrangular, stomatiferous on all 4 sides: cone-scales firm, closely appressed before maturity, usually entire and rounded at apex. (Sect. *Morinda* Mayr.)

1. **P. Smithiàna** Boiss. HIMALAYAN S. Tree to 50 m., with spreading brs. and slender pendulous glabrous gray and lustrous brts.; buds to 8 mm. long, ovoid, acute: lvs. radially spreading, slender, 2–4 cm. long, acute, straight or incurved, usually higher than broad, bright or dark green: cones cylindric, 12–18 cm. long, lustrous brown, green before maturity; scales broad-obovate, rounded and entire at apex. P.I.39(c,h). G.C.III.35:325;38:395. F.E.16: 705(h). H.E.6:t.345(h). (*P. Morinda* Link, *P. Khutrow* Mast.) Himal. Intr. 1818. Zone VI.—Handsome and graceful tree of broad-pyramidal habit with pendulous brts.

2. **P. Schrenkiàna** Fisch. & Mey. Tree to 35 m. or more, with pendulous brts.: buds subglobose, the terminal one with acuminate, keeled pubescent scales at base: brts. glabrous, gray: lvs. nearly radially arranged, pointing forward, 2–3.5 cm. long, or on young plants often slightly shorter, finely pointed, straight or curved, dull green: cones cylindric-oblong, 7–10 cm. long; scales obovate, rounded and entire at apex. C.B.2:48. M.D.1910:227, 229(h). (*P. obovata* var. *S.* Mast.) C. Asia. Intr. 1877. Zone V.

3. **P. Watsoniàna** Mast. Narrow-pyramidal tree to 20 m.; buds brown, not resinous, with obtuse closely appressed scales; brts. glabrous, lustrous, yellow or yellowish gray: lvs. slender, 1–2 cm. long, scarcely 1 mm. broad, acuminate or acute, straight, dark green: cones cylindric-oblong, 4–6 cm. long, falling soon after maturity; scales obovate, entire, rounded or abruptly produced into a short point. C. and W. China. Intr. 1901. Zone V.—Distinguished by its very thin slender lvs.

4. **P. Wilsònii** Mast. Pyramidal tree to 25 m., with short spreading brs.; buds ovoid, dark brown and lustrous; brts. glabrous, pale gray, with scarcely raised petioles: lvs. stout, straight or curved, pungent, 1–1.5 cm. long, dark green: cones cylindric-oblong, 4–6 cm. long, persisting about one year after maturity; scales suborbicular, entire, finally recurved at the margin. G.C. III.33:133. Gn.88:167(h). B.D.1923:t.21(h). C. China. Intr. 1908. Zone V.—Handsome spruce of dense habit.

5. **P. aurantíaca** Mast. Tree to 25 m., spire-like, with short horizontal brs.; bark pale gray, nearly white, exfoliating in thin plates; buds conical, resinous, with obtuse scales, becoming revolute at apex; brts. glabrous, orange, often slightly bloomy, with prominent spreading petioles: lvs. 1–1.8 cm. long, sharply pointed, often curved: cone cylindric, 10–12 cm. long, with broad rounded slightly erose scales. W. China. Intr. 1908. Zone V.

6. **P. Maximowíczii** Reg. Tree to 25 m., occasionally to 40 m., with horizontal brs. ascending at the ends: buds 3–4 mm. long, resinous, with firmly appressed scales; brts. glabrous, yellowish or reddish brown: lvs. spreading, rigid, 8–15 mm. long, acute, dark green: cones oblong, 3–6 cm. long, lustrous brown, green before maturity; scales rounded, entire. G.C. III.58:99,f.18–27. W.C.21,22(h). (*P. excelsa* var. *obovata japonica* Beiss., *P. Tschonoskii* Mayr.) Japan. Intr. 1865. Zone IV.—In cult. usually a small bushy tree, without particular ornamental merit.

7. **P. polìta** Carr. TIGERTAIL S. Tree to 30 or occasionally to 40 m., with slender brs. of moderate length; bark gray, rough; buds dark brown, acute, 6–10 mm. long, their scales long persistent as blackish sheath at base of brts.; brts. stout, pale yellow, glabrous: lvs. radially spreading, rigid, 1.5–2 cm. long, spiny pointed, often curved, lustrous dark green: cones oblong, 8–10 cm. long, brown, yellowish green before maturity; scales broad, rounded, irregularly denticulate. S.Z.2:t.111(c). S.I.2:t.2(c). G.C.III.21:251. W.C.t. 19,20(h). (*P. torano* Koehne, *P. Thunbergii* Aschers. & Graebn.) Japan.

Intr. 1861. Zone V.—Very distinct tree with rigid spiny lvs. and conspicuous winter-buds.

8. **P. heterólepis** Rehd. & Wils. Tree to 25 m.; buds large, ovoid, light brown, resinous, with obtuse revolute scales; brts. reddish or yellowish brown, glabrous, with spreading prominent petioles: lvs. stout, 1–2 cm. long, often slightly curved, spiny-pointed, bluish green, often glaucescent: cones cylindric, 9–14 cm. long; scales rhombic-ovate, rigid, the lower ones deeply emarginate at apex. W. China. Intr. 1910. Zone V.

9. **P. asperàta** Mast. Tree to 35 m.; bark grayish brown, peeling off in thin flakes: buds ovoid or conical, yellowish brown; brts. yellowish, pubescent, with spreading petioles: lvs. 1–1.8 cm. long, acute, often curved: cones cylindric-oblong, 8–10 cm. long, fawn-gray, finally chestnut-brown; scales obovate, rounded and entire at apex. C.C.17. Gn.88:166(h). S.N.32,208(h). W. China. Intr. 1910. Zone V.—The most vigorous of the Chinese spruces; similar in general appearance to the Norway S.—Var. **notàbilis** Rehd. & Wils. Lvs. 1.2–2 cm. long: cones 9–12 cm. long, with rhombic-obovate scales narrowed toward the apex.—Var. **ponderòsa** Rehd. & Wils. Bark thicker; brts. nearly glabrous: cones 12–15 cm. long.

10. **P. Ábies** Karst, Norway S. Tree to 50 m., with spreading brs. and usually pendent brts.; bark reddish brown; buds reddish or light brown, without resin, scales often with spreading tips, the terminal bud with a few acuminate keeled pubescent scales at base: brts. usually brown, glabrous or minutely pubescent: lvs. 1–2, rarely to 2.5 cm. long, acute, dark green and usually lustrous: cones pendulous, cylindric, 10–15 cm. long, light brown, purple or green before maturity; scales thin, rhombic-ovate, with a truncate, erose-denticulate or emarginate apex. H.W.1:54–61,t.1(c). F.E.15:t.50(h). S.N.15(h). (*P. excelsa* Link, *P. rubra* A. Dietr., *Pinus Abies* L., *Pinus Picea* Dur.) N. and C. Eu. Long cult. Zone II.—Early intr. to Am. and much planted as an ornamental tree and also for shelters and wind-breaks. It is a rapidly growing pyramidal tree of graceful habit with dark green foliage, but like other spruces and firs it looses much of its beauty when growing older.—The typical form distinguished as var. **erythrocárpa** Rehd. (*P. excelsa* var. *e.* Purkyne) has the cones violet-purple before maturity and the lvs. usually spreading, while var. **chlorocárpa** Th. Fries (*P. excelsa* var. *c.* Purkyne) has the young cones green and the lvs. usually more or less appressed and obtusish and leafs later. Another spontaneous form is var. **nígra** Th. Fries (*P. excelsa* var. *n.* Willk.), a densely branched pyramidal tree with crowded falcate obtusish and dark green lvs.—A large number of garden forms is in cult.

Forms differing in color of lvs.: Var. **argéntea** Rehd. Lvs. variegated with white. (*P. exc. variegata* Beiss.)—Var. **argénteo-spìca** Rehd. Tips of young brts. white. S.N.221,223. (*P. exc. a.* Hesse.)—Var. **finedonénsis** Nash. Lvs. pale yellow at first, changing to bronzy-brown and finally to green. (*P. exc. f.* Beiss.)

Columnar and narrow-pyramidal forms: Var. **pyramidàta** Rehd. Brs. ascending at an acute angle, the lower ones very long decreasing toward the apex, forming a narrow slender pyramid. Gt.74:340(h). S.N.120(h). (*P. exc. p.* Carr., *P. exc.* f. *pyramidalis* Voss.)—Var. **cupréssina** Rehd. Tree with ascending densely ramified brs. forming a dense broad column. M.D.1909:t. 8(h). (*P. exc. c.* Thomas.)—Var. **columnàris** Rehd. With very short horizontal or slightly pendulous much ramified brs. forming a narrow column. Conwentz, Beob. Waldb. Westpreuss. t.3(h). (*P. exc. c.* Carr.)

Pendulous or sparingly branched forms: Var. **péndula** Nash. With pendulous brs. and brts. Gt.52:434(h). (*P. exc. p.* Jacques & Herincq.)—Var. **invérsa** Nash. Similar to the preceding, with the brs. densely ramified and more closely appressed to the stem: lvs. thickish and lustrous. G.C.III.29: 363(h). F.E.22:765(h). S.N.211(h). (*P. exc. i.* Beiss.)—Var. **viminàlis** Th. Fries. Brs. almost horizontal in remote whorls with very long and slender brts., often to 3 m. long. H.W.1:64(h). S.N.218(h). (*P. exc. v.* Casp.) —Var. **virgàta** Th. Fries. Sparingly branched, with much elongated straight or curved brs. destitute of brts., usually the upper ones ascending, the lower pendent. R.H.1854:102(h). M.G.9:31(h). (*P. exc.* var. *v.* Casp., *P. exc. Cranstoni* Carr.)—Var. **monstròsa** Rehd. A form destitute of all brs., consisting of a single thick stem clothed with thick rigid lvs. Zeitschr. Forst. Jagdwes. 25:228(h). (*P. exc. m.* Schroet., *P. exc. monocaulis* Noerdl.)

Dwarf forms: Var. **cònica** Th. Fries. Dense conical form with ascending brs. and light brown slender brts.: lvs. radially spreading, thin and pointed. (*P. exc. c.* Carr.).—Var. **élegans** Rehd. Slender conical form similar to the preceding, with very short crowded brts. densely clothed with short pointed laterally compressed lvs. (*P. exc. e.* Beiss.)—Var. **Remóntii** Rehd. Dense pyramidal or ovoid form with short crowded light yellow brts. and radially spreading fine light green lvs. F.E.16:491(h). M.G.21:556(h). (*P. exc. R.* Beiss.)—Var. **pygmaèa** Rehd. Dense small pyramidal form with ascending brs. and bright green lvs. (*P. exc. p.* Carr.)—Var. **Bárryi** Nash. Conical form with thick brs. and rather distant short brts. S.N.47(h). (*P. exc. B.* Beiss.) —Var. **Ellwangeriàna** Rehd. Broad-pyramidal form with crowded slender brts. and small slender acute lvs. (*P. exc. E.* Beiss.)—Var. **nàna** Nash. Conical or subglobose form with short crowded ascending brs. and orange-yellow brts. partly swollen and irregular: lvs. stiff, appressed, about 1 cm. long and abruptly pointed, H.D.117,t.(h).—Var. **parvifórmis** Rehd. Broad-pyramidal form with slender regularly arranged brts. and crowded very short, acute, bright green lvs. (*P. exc. p.* Beiss.)—Var. **microspérma** Rehd. Dense conical or subglobose form with crowded ascending brs. and gray-brown brts.: lvs. bright green, close-set and pointing forward, thick, slightly curved and bluntly pointed. B.E.t.34(h). H.D.116,t(h).—Var. **compácta** Nash. Subglobose dense form with slender brts. and acute lvs. F.E.16:t.65(h).— Var. **Clanbrasiliàna** Th. Fries. Compact subglobose, rather flat-topped bush, rarely exceeding 2 m., with very short crowded thin whitish brts.: lvs. nearly radiate and pointing forward or pectinate beneath, thin, 4–8 mm. long, slender-pointed, lustrous bright green. H.D.90,t(h). (*P. exc. C.* Carr.)— Var. **Gregoryàna** Nash. Dwarf subglobose or conical form, rarely exceeding 75 cm. in height, with short crowded spreading brs. and very crowded thin whitish to gray-brown brts. slightly pubescent in the grooves: lvs. radially arranged, 6–12 mm. long, gray-green. (*P. exc. G.* Beiss.)—Var. **Veitchii** Rehd. Similar to the preceding, but less compact and more conical, with longer brts. inclined to droop: lvs. of lateral brts. thinner and flatter and pectinate beneath. H.D.98,t(h). B.E.t.34(h, as var. *Clanbrasiliana*).—Var. **Parsónsii** Rehd. Similar to var. *Gregoryana*, but of looser more straggling habit, with spreading brs. and pendulous brts.: lvs. thinner and flatter, more distant, pectinate below on most brts. H.D.99,t.(h). (*P. exc. Gregoriana* f. *P.* Hornibrook.)—Var. **Mérkii** Rehd. Dense low roundish form with rather fine yellowish white brts. and very thin, lustrous grass-green lvs. pectinate below. (*P. exc. M.* Ohlendorff.)—Var. **pùmila** Nash. Dwarf and dense, depressed-globose form with red-brown thick and stiff brts. and thin

lvs. tapering to a blunt point, either dark green (*P. exc. pumila nigra* Beiss.) or bluish green (*P. exc. pumila glauca* Beiss.). S.N.43,219(h).—Var. **Maxwéllii** Nash. Low dense flat form, the brs. often with fascicled short brts.: lvs. bright green, radially arranged, rigid, finely pointed. H.D.103,t(h). (*P. exc. M.* Beiss.)—Var. **procúmbens** Rehd. Prostrate form with horizontal brs. and numerous short bright yellow brs. and pointed yellow-green thin lvs. (*P. exc. p.* Carr., var. *prostrata* Schneid.)—Var. **tabulifórmis** Th. Fries. Prostrate form with slender horizontally spreading brs. and rather distant yellow-brown brts.: lvs. very thin, yellow-green, blunt (*P. exc. t.* Carr.).

11. **P. obovàta** Ledeb. SIBERIAN S. Tree to 30 or occasionally to 50 m., similar to *P. Abies;* buds conical, with closely appressed scales, the terminal buds with keeled, acuminate, ciliate scales at base; brts. brown, minutely pubescent: lvs. 1–1.8 cm. long, acute, slightly higher than broad in cross-section, deep green: cones cylindric-ovoid, 6–8 cm. long, brown, purple before maturity; scales obovate, with thin rounded and entire margin or slightly produced and sometimes emarginate. C.B.2:42. (*P. excelsa* var. *o.* Blytt.) N. Eu. to Kamtchatka and Manch. Intr. about 1852? Zone II.—A smaller, more graceful tree than the Norway Spruce.—Var. **fénnica** Henry. Lvs. dark green: cone-scales rounded, finely denticulate. (*P. excelsa* var. *f.* Schroet. *P. exc.* var. *medióxima* Willk.) N. Eu.—Var. **alpéstris** Henry. Slow growing compact tree; brts. densely short-pubescent: lvs. obtuse or acutish, 1–1.5 cm. long, bluish or grayish green: cones 8–12 cm. long. (*P. excelsa* var. *a.* Bruegg.) Alps, at high altitudes.—Resembles somewhat *P. glauca.*

12. **P. orientàlis** Carr. ORIENTAL S. Tree to 40 or occasionally to 60 m., with ascending or spreading brs. and slightly pendulous brts.; bark brown, scaly; buds acute, brown, the terminal buds with a few keeled acuminate scales at base; brts. pale brown, short-pubescent: lvs. stout, straight, 6–10 mm. long, obtuse, lustrous dark green, crowded and appressed to the brt.: cones cylindric-ovoid, 6–9 cm. long, brown, violet before maturity; scales obovate, rounded and entire. P.I.41(c,h). G.C.III.3:754. S.N.16(h). C.L. 11:311(h). Cauc., Asia Minor. Intr. 1837. Zone IV.—A graceful compact tree with dark glossy foliage; of slow growth.—Var. **aureo-spicàta** Beiss. Young lvs. yellow changing later to green.—Var. **aùrea** Hesse. Lvs. bronzy-golden.—Var. **nàna** Carr. Low broad-pyramidal form, with the lower brs. horizontal and wide-spreading.

13. **P. Meỳeri** Rehd. & Wils. Medium-sized tree; buds conical, light brown, resinous; brts. yellowish or light brown, pubescent or rarely nearly glabrous, often densely pubescent one year and the continuation of the same br. glabrescent the following year: lvs. 8–18 mm. long, obtusish, often curved, bluish green: cones cylindric-oblong, 6–7 cm. long, lustrous brown, with obovate rounded scales. N. China. Intr. 1910. Zone V.

14. **P. Koyamài** Shiras. Narrow-pyramidal tree to 20 m.; bark grayish brown, scaly; buds conical, brown, resinous; brts. reddish brown and slightly bloomy, the lateral ones glandular-pubescent, the primary nearly glabrous: lvs. slightly compressed, 8–12 mm. long, acute or obtuse, straight or curved, with 2 white bands above each with 5–8 rows of stomata, those below with 2–4 rows and inconspicuous: cones cylindric-oblong, 4–10 cm. long, pale brown, green before maturity; scales broad, rounded, denticulate, very firm. G.C.III.58:98. W.C.t.23(h). S.N.207(h). (*P. koraiensis* Nakai, *P. moramomi* Hort.) Japan, Korea. Intr. 1914. Zone V.

15. **P. bícolor** Mayr. ALCOCK S. Broad-pyramidal tree to 25 m.; bark pale gray to gray-brown, fissured into thin flakes: buds ovoid or conical, brown,

slightly resinous; brts. lustrous, yellow or reddish brown, the lateral shoots glabrous, the primary ones hairy: lvs. slightly compressed, 1–2 cm. long, acuminate, dark green, the stomatic bands above each with 5–6 rows, those below with 2 rows of stomata: cones cylindric-oblong, 6–12 cm. long, brownish, purple before maturity; scales obovate, rounded or somewhat narrowed at apex, slightly denticulate. S.I.1:19(c). G.C.II.13:212. S.N.14(h). W.C.t. 19,20(h). (*P. Alcockiàna* Carr.) Japan. Intr. 1861. Zone IV.—Var. **aciculàris** Shiras. Brts. finely pubescent: lvs. curved: cone-scales entire. G.C.III. 58:98. Cult. 1923.—Var. **refléxa** Shiras. Brts. pubescent: lvs. curved, 1–1.5 cm. long: cone-scales nearly entire, slightly attenuate and recurved at apex. G.C.III.58:98. Cult. 1923.

16. **P. rúbra** Link. Red S. Tree to 30 m., with short and slender brs. forming a narrow-pyramidal head; bark red-brown, fissured; buds ovoid, acute, the terminal buds with pubescent subulate scales at base; brts. brown, pubescent: lvs. 1–1.5 cm. long, acute and mucronulate, lustrous dark or bright green: cone oblong, 3–4 cm. long, reddish brown, green or purplish green before maturity: scales obovate, rounded and entire or slightly denticulate at margin, rigid. S.S.12:t.597. P.I.44(c,h). Am. For. 22:705(h). (*P. rubens* Sarg., *P. australis* Small.) N. S. to the high peaks of N. C. Intr. before 1750. Zone I.—Handsome tree of narrow-pyramidal habit, but it requires a cool and moist climate.—Var. **virgàta** Rehd. Sparingly branched form with long brs. nearly destitute of brts. G.F.8:45(h).

17. **P. mariàna** B.S.P. Black S. Tree to 18 or occasionally to 30 m., with slender often pendulous brs. forming a narrow, often irregular head; bark, brts. and buds similar to *P. rubra*: lvs. 6–18 mm. long, obtusish, dull dark or bluish green, with the stomatic bands broader above than below: cones ovoid, 2–3.5 cm. long, dull grayish brown, dark purple before maturity; scales rigid, rounded and finely denticulate at the margin. S.S.12:t.596. P.I.43(c,h). Bot. Gaz. 55:452(h). (*P. nigra* Link, *P. brevifolia* Peck.) Lab. to Alaska, s. to Wisc. and Mich. and in the mts. to Va. Intr. 1700. Zone I.—Usually a small tree of thin habit, but the following vars. are more ornamental.—Var. **Doumétii** Schneid. Dense conical form with ascending crowded brs. (*P. nigra D.* Carr.)—Var. **Beissneriàna** Rehd. Similar to the preceding, but broader at the base and the lvs. of lighter bluish green. G.C.III.11:80(h). B.H.263(h). (*P. nigra Mariana* Beiss.)—Var. **fastigiàta** Rehd. Columnar form with ascending brs. and short acute lvs. (*P. nigra f.* Carr.)—Var. **ericoìdes** Rehd. Conical slow-growing form with very slender brts., the leading shoot glabrescent: lvs. very thin, blue-green and finely pointed. (*P. e.* Mast.)

P. m. × *jezoensis* = *P. Moseri*; see under no. 25.

18. **P. Glèhnii** Mast. Saghalin S. Tree to 40 m., with slender short brs.; bark red-brown, fissured into thin flakes; buds ovoid or conical, resinous, chestnut-brown, the terminal buds with subulate scales at base; brts. reddish brown, densely short-pubescent: lvs. slightly compressed, 6–12 mm. long, obtuse or on young plants pointed, deep green, with 2 rows of stomata on each side above and 1 below: cones cylindric-oblong, 5–8 cm. long, lustrous brown, violet, rarely green before maturity; scales suborbicular, rounded or slightly produced in the middle, entire or slightly erose. B.M.9020(c). W.C.25,26(h). Saghalin, Japan. Intr. before 1891. Zone III or IV.—Handsome narrow-pyramidal tree.

19. **P. glaùca** Voss. White S. Tree to 30 m., with ascending brs. and usually pendent brts.; bark grayish, scaly; buds ovoid, obtuse, with glabrous loosely imbricated scales rounded and bifid at apex; brts. glabrous, grayish

or pale brown: lvs. 8–18 mm. long, acute or acutish, slightly curved, more less bluish green, of strong disagreeable odor when bruised: cones cylindric-oblong, 3.5–5 cm. long, pale brown and glossy, green before maturity; scales suborbicular, with rounded and entire margin, thin and flexible. S.S.12:t.598. P.I.42(c,h). F.E.29:81(h). S.N.40(h). (*P. canadensis* P.S.P., not Link, *P. alba* Link, *P. laxa* Sarg.) Lab. to Alaska, s. to Mont., Minn. and N. Y. Intr. 1700. Zone I.—Dense pyramidal tree with light bluish green lvs.—Var. **coerùlea** Rehd. Of dense habit and with glaucous lvs. (*P. alba c.* Carr.)—Var. **aùrea** Rehd. With yellow lvs. (*P. alba a.* Beiss.)—Var. **nàna** Rehd. Dwarf dense form with less crowded spreading lvs. (*P. alba n.* Carr.)—Var. **albertiàna** Sarg. Tree to 50 m., of narrow-pyramidal habit; buds with entire scales, slightly resinous; brts. sometimes minutely pubescent: cones usually smaller, with stiffer, sometimes slightly denticulate scales. B.T.58. M.G. 20:117(h). S.N.206(h). (*P. a.* S. Brown, *P. alba a.* Beiss.) B. C. to Mont. and S. D. Intr. 1906. Zone IV.—Var. **cònica** Rehd. A dwarf and slow-growing form of the preceding var., of very dense narrow-conical habit with very thin radially spreading lvs. about 1 cm. long. G.C.III.75:107(h). Gn.M. 32:38(h). B.H.1:208(h). Intr. 1904.

Sect. II. Casicta Mayr. Lvs. quadrangular or compressed from above and beneath without or with fewer lines of stomata than above: cone-scales loosely appressed before maturity, at maturity thin and flexible, usually rhombic, with erose and wavy margin.

20. **P. Engelmánni** Engelm. Engelmann S. Tree to 50 m., with slender, spreading brs. in close whorls; buds brownish yellow, its scales usually revolute at apex; brts. pale brownish yellow, minutely glandular-pubescent: lvs. slender, 1.5–2.5 cm. long, acute, straight or slightly curved, usually bluish green, without resin-ducts, of disagreeable odor when bruised: cones cylindric-oblong, 3.5–7.5 cm. long, light brown, green and tinged with red before maturity; scales rhombic-oblong, narrowed and usually truncate at the erose apex. S.S.12:t.599. P.I.46(c,h). B.E.t.38(h). (*P. columbiana* Lemm.) B. C. and Alb. to Ore., Ariz. and N. Mex. Intr. 1862. Zone I.—A desirable ornamental tree of dense pyramidal habit.—Var. **glaùca** Beiss. Lvs. glaucous. —Var. **argéntea** Beiss. Lvs. silvery gray. M.G.21:557(h).—Var. **Féndleri** Henry. Brts. pendulous: lvs. slender, to 2.8 cm. long, with 4 rows of stomata on each side above and half as many beneath. Supposed to have come from N. Mex.

21. **P. pungens** Engelm. Colorado S. Tree to 30 or occasionally to 50 m., with horizontal stout brs. in rather remote whorls; buds with brownish yellow usually reflexed scales; brts. glabrous, bright yellowish brown: lvs. rigid, 2–3 cm. long, spiny pointed, incurved, bluish green, rarely dull green: cones cylindric-oblong, 6–10 cm. long, light brown; scales thin, flexible, rhombic-oblong, narrowed and erose at apex. S.S.12:t.600. B.E.283,t.38(h). Gng.7:49(h). (*P. Parryana* Sarg., *Abies Menziesii* Engelm., not Lindl.) Colo. to N. Mex., Utah and Wyo. Intr. 1862. Zone I.—A favorite tree for planting on lawns, particularly in its bluish and silvery white forms; for dry climates it is perhaps the best of all spruces.—Var. **viridis** Reg. Lvs. green (*P. commutata* Hort., not Murr.)—Var. **glaùca** Beiss. Lvs. bluish green. Gn. 63:280(h). Gn.M.2:26(h).—Var. **coerùlea** Beiss. Lvs. bluish white. G.W.1: 357(h).—Var. **argéntea** Beiss. Lvs. silvery white. Gt.53:493. M.G.16:178(h). (Var. *Kosteri* Beiss., var. *Kosteriana* Hort.)—Var. **Kosteriàna** Mast. With pendulous brs. and bluish lvs. (Var. *glauca pendula* Beiss.)—Var. **compácta** Rehd. Dwarf compact rather flat-topped form with the brs. in almost hori-

zontal layers and with rigid dark green lvs. H.D.128,t(h). Gn.M.32:39(h). —Var. **Hunnewelliàna** Hornibrook. Dwarf form of dense pyramidal habit, with rather slender flexible lvs. 1.5–2 cm. long.

22. **P. montígena** Mast. Tree to 30 m.; buds ovoid, acute, resinous, the terminal buds with the lower scales acuminate and keeled; brts. yellow or pale brown, hairy: lvs. slightly compressed, 8–12 mm. long, obtuse or acutish, obtusely keeled above, curved, with 2 white bands above each with about 5 rows of stomata, below with inconspicuous bands of 2–3 rows each: cones cylindric-oblong, 7–10 cm. long, cinnamon-brown, with rhombic-ovate, thin, erose scales. G.C.III.39:146(excl. cones). W. China. Intr. 1908 to Am. Zone V.

23. **P. Balfouriàna** Rehd. & Wils. Tree to 40 m., with short horizontal brs.; bark gray, broken into thick irregular scales: brts. densely villous, yellowish or yellowish gray, with spreading yellow petioles 1 mm. long; buds conic-ovoid, slightly resinous, with appressed scales: lvs. compressed, 8–15 mm. long, straight to slightly curved, acutish or obtuse, with 2 white bands above, the bands beneath inconspicuous with 1–4 rows of stomata each: cones ovoid-oblong, 6–8 cm. long, violet-purple before maturity; scales striate toward the apex, erose and usually lacinate and undulate. Gn.88:124(h). W. China. Intr. 1910. Zone (V).

24. **P. purpúrea** Mast. Tree to 20 m.; bark dark gray, fissured into thin scales; buds conical, resinous, with appressed scales; brts. orange-yellow, densely pubescent, with short spreading petiole: lvs. compressed, 8–12 mm. long, obtuse or acutish, with 2 white bands above, green beneath and usually with 2 incomplete rows of stomata: cones cylindric-oblong, 5–6 cm. long, more or less purple at maturity; scales rhombic-oblong, narrowed above the middle, acutish or truncate at apex, erose-denticulate. S.N.224(h). (*P. likiangensis* var. *p.* Dallim. & Jacks.) W. China. Intr. 1910. Zone V.

A related species is **P. likiangénsis** Pritz. Brts. pale yellow, with spreading petioles 1 mm. long: lvs. acute or mucronate: cone cylindric-oblong, about 8 cm. long; scales rhombic-ovate, denticulate and nearly rounded at apex. J.L.49:t.7(h). W. China. Intr. before 1910.

25. **P. jezoénsis** Maxim. Yeddo S. Tree to 50 m., with spreading slender brs.; bark gray, scaly, deeply fissured on old trees; buds conical, lustrous, resinous; brts. glabrous, lustrous, yellowish brown or greenish yellow, with slightly swollen pulvini and recurved petioles: lvs. compressed, 1–2 cm. long, acute, slightly curved, slightly keeled on both sides, with white bands above, dark green and lustrous beneath: cones cylindric-oblong, 4–7.5 cm. long, light brown, green, tinged with brown before maturity; scales rhombic-oblong, erose and denticulate. S.I.2:t.3(c). G.C.III.3:53. W.C.27:t.28,29(h). (*P. ajanensis* Fisch., *Abies Alcockiana* Veitch, partly.) Manch., Saghalin, N. Japan. Intr. 1878. Zone IV.—Var. **hondoénsis** Rehd. Tree to 30 m.; brts. usually light reddish brown, with the pulvini much swollen: lvs. shorter, more obtuse, duller bluish green. B.M.6743(c). S.I.1:t.5(c). S.N.225,228(h). (*P. h.* Mayr, *P. ajanensis* var. *microsperma* Beiss., not Mast.) C. Japan. Intr. 1860. Zone V.—The typical form is not doing well in the E. States and suffers often from late frosts owing to early leafing; the var. is more satisfactory.

P. j. × *mariana* = **P. Mòseri** Mast. Lvs. slender, green beneath, white above. J.L.26:105. R.H.1902: 164.

26. **P. sitchénsis** Carr. Sitka S. Tree to 40 or occasionally to 60 m., with slender horizontal brs. forming a broad-pyramidal tree while young; bark red-brown; buds conical, acutish, light brown, resinous; brts. glabrous,

light brownish yellow: lvs. compressed, 1.5–2.5 cm. long, spiny-pointed, slightly keeled and silvery white above, rounded and lustrous bright green beneath: cones cylindric-oblong, 6–10 cm. long, pale yellowish or reddish brown: scales rhombic-oblong, rounded and erose at apex. S.S.12:t.602. G.C.II.25:728,729. S.N.229(h). (*Abies Menziesii* Lindl.—Tideland S.) Alaska to Calif. Intr. 1831. Zone VI.—Highly ornamental tree with handsome foliage, but it demands a cool humid climate and is not satisfactory in the E. States.—Var. **speciòsa** Beiss. Of compact habit and slower growth with more ascending brs. and shorter more rigid lvs.

Sect. III. Omorica Willk. Lvs. compressed, with glaucous bands above, green beneath: cone-scales closely appressed before maturity, firm, broad and usually entire or nearly so at apex.

27. **P. brachýtyla** Pritz. Tree to 25 m., with pendent brs.; bark dark or grayish brown, deeply fissured; buds ovoid, brown, not resinous, with obtuse firmly appressed scales; brts. orange-yellow, glabrous or sometimes pubescent, with short petioles: lvs. compressed, 1–2.2 cm. long, about 1 mm. broad, acute, white above, without distinct green midrib, dark green and keeled beneath: cones cylindric-oblong, 6–12 cm. long, dark brown, with obovate rounded and entire scales. B.M.8969(c). (*P. pachyclada* Patschke.) C. China. Intr. 1901. Zone V?

A closely related species is **P. complanàta** Mast. Brs. horizontal; brts. short, pendulous, orange-brown, usually pubescent, with very short petioles and swollen pulvini: lvs. 1–2 cm. long: cones 12–16 cm. long, with rounded or truncate, slightly denticulate scales. G.C.III.39:147 (except cone in upper right corner). S.N.33(h). W. China. Intr. 1903. Zone (V).

28. **P. Sargentiàna** Rehd. & Wils. Tree to 25 m., with spreading slightly pendent brs.; bark grayish brown, fissured into irregular plates; brts. orange to pale yellow, stipitate-glandular, the leading shoots glabrescent, with short, slightly recurved petioles: lvs. compressed, curved, 1–1.5 cm. long, acutish or obtuse, about 1.5 mm. broad, white above, green and lustrous beneath, keeled on both sides: cones cylindric-oblong, 6–12 cm. long, often persistent one year after maturity; scales broadly cuneate-obovate, rounded or truncate at apex; bracts minute, rounded at apex. W. China. Intr. 1910. Zone (V).

29. **P. ascéndens** Patschke. Tree to 25 m., with horizontal brs. upturned at the ends and with slender pendent brts.; brts. pale brown, setose or the leading shoots glabrescent: lvs. compressed, acutish or obtusely mucronulate, 1–1.8 cm. long, white above, green and keeled beneath: cones cylindric-oblong, 7–10 cm. long; scales rhombic, narrowed toward the truncate or emarginate erose apex; bracts linear-oblong, obtuse, 4–5 times shorter than the scale. (*P. brachytyla* f. *rhombisquama* Stapf.) W. China. Intr. 1910. Zone (V).

30. **P. omórika** Purkyne. Servian S. Tree to 30 m., with rather short spreading and ascending brs. forming a narrow-pyramidal head; buds dark brown, not resinous, the terminal bud with long subulate scales at base; brts. brown, pubescent; lvs. compressed, 8–18 mm. long, keeled on both sides, about 2 mm. wide, obtuse and mucronulate, with 2 broad white bands above, lustrous dark green beneath: cones ovoid-oblong, 3–6 cm. long, lustrous cinnamon-brown; scales suborbicular, finely denticulate. P.I.49(c,h). G.C.III.21:153. W.A.84,t.(h). E.H.1:t.28(h). (*Pinus o.* Pancic.) S. E. Eu. Intr. about 1880. Zone IV.—A very desirable spruce of slow growth, forming a dense narrow pyramidal tree; hardy and very satisfactory in the E. States.

31. **P. Breweriana** S. Wats. Tree to 40 m., with spreading brs. and whip-

like pendulous brs. often 2.5 m. long; buds conical, chestnut-brown; brts. reddish brown, pubescent, with long and spreading petioles: lvs. radially spreading, slightly compressed, 2–2.5 cm. long, obtuse, straight or slightly curved, nearly flat and with white bands above, rounded and dark green below: cones cylindric-oblong, 6–12 cm. long, light orange-brown, purplish before maturity; scales obovate, entire. S.S.12:601. G.F.3:66i5:595. S.N. 224(h). R.H.1922:49(h). S. Ore. and N. Calif. Intr. 1893. Zone (V).—Remarkable for its whip-like brs., but rare in cult. and usually not satisfactory.

32. **P. spinulòsa** Henry. Tree to 60 m., with long and slender pendulous brts.; buds ovoid, obtuse, scarcely resinous; brts. glabrous, yellowish gray: lvs. imperfectly radially spreading, slender, slightly compressed, 2–3.5 cm. long, acute, pungent, keeled on both sides, with 2 glaucous bands above, green below: cones cylindric-oblong, 6–10 cm. long; scales suborbicular, entire or slightly denticulate. B.M.8169(c). G.C.39:218. S.N.222(h). (*P. morindoides* Rehd.) Himal. Intr. about 1878. Zone VIII?—Handsome spruce of rather loose, broad-pyramidal habit.

20. **LÁRIX** Mill. Larch. Deciduous trees with horizontal brs.; bark thick, scaly; buds small, subglobose, with imbricate scales, the inner ones accrescent: lvs. spirally arranged and remote on the long shoots, densely clustered on the lateral short spurs, linear, flattened, rarely nearly quadrangular: fls. monoecious, solitary, terminal; male fls. globose to oblong, stalked or sessile, yellow, consisting of numerous short-stalked spirally arranged anthers; female fls. subglobose, consisting of few or many 2-ovuled scales borne in the axils of larger usually scarlet bracts: cone subglobose to oblong; scales suborbicular to oblong, persistent on the axis, maturing the first year; seeds 2 under each scale, nearly triangular, with large membranous wing; cotyledons usually 6. (The ancient Latin name.) About 10 species in the cooler regions of the n. hemisphere, chiefly in the mts.; in Asia s. to the Himal.

A. Bracts conspicuous, exceeding the scales.
B. Lvs. keeled on both sides ..... 1. *L. Potaninii*
BB Lvs. rounded above, keeled only below ..... 2. *L. occidentalis*
AA. Bracts shorter than scales, usually concealed: lvs. flat or rounded above.
B. Cone-scales recurved at apex: lvs. with 2 conspicuous white bands below. 3. *L. Kaempferi*
BB. Cone-scales straight or incurved at apex: lvs. very narrow, without white bands.
C. Cone-scales puberulous or tomentulose outside, 30–50.
D. Cone-scales not incurved at apex, straight; bracts about half as long as scale: lvs. up to 3.5 cm. long ..... 4. *L. decidua*
DD. Cone-scales slightly incurved at apex, longitudinally convex; bracts ⅓ as long as scale: lvs. up to 5 cm. long ..... 5. *L. sibirica*
CC. Cone-scales glabrous outside, lustrous, striate, 12–40.
D. Brts. usually pubescent, reddish brown or yellowish: lvs. exceeding 3 cm.: cones 1.5–3 cm. long, with 20–40 scales ..... 6. *L. dahurica*
DD. Brts. glabrous, brown, often glaucous: lvs. to 3 cm. long: cones about 1.5 cm. long, with 12–15 scales ..... 7. *L. laricina*

1. **L. Potaninii** Batal. Chinese L. Tree to 30 m., with gray or grayish brown bark and rather short horizontal brs.; brts. pendulous, glabrous, lustrous, orange-brown or reddish brown, the buds of similar color but darker: lvs. compressed, slender, 1.5–3 cm. long, acute, grayish green, with stomatic bands on both sides each of 1 or 2 rows: cones ovoid-oblong, 3–4.5 cm. long, at maturity violet-purple changing to grayish brown; scales suborbicular, slightly incurved, entire; bracts long-acuminate, exserted, upright, purple. G.C.III.39:178. C.C.7. S.N.196(h). (*L. chinensis* Beiss., *L. thibetica* Franch.) W. China. Intr. 1904. Zone V.

A closely related species is **L. Mastersiàna** Rehd. & Wils. Brts. pale yellowish brown, slightly pubescent when young: lvs. bright green, with 2 pale stomatic bands beneath: cone pale brown, with long acuminate purple bracts exserted and reflexed. W. China. Intr. 1908.—Another related species is **L. Lyállii** Parl. Tree to 25. m., with remote long brs.; brts. stout, brown-tomentose: lvs. 4-angled, rigid, 2.5–3.5 cm. long: cones ovoid-oblong, 3.5–5 cm. long; scales pubescent, spreading at maturity and finally reflexed; bracts exserted, upright. S.S.12:t.595. S.N.198(h). Hight mts. of B. C. and Alb. to Wash. and Mont. Intr. 1904, but not yet successfully cult.

2. **L. occidentàlis** Nutt. WESTERN L. Tree to 50 m., occasionally to 80 m., with short horizontal or sometimes elongated brs.; bark dark-colored, cinnamon-red on old trunks; buds dark, chestnut-brown; brts. pubescent when young, soon glabrous, orange-brown: lvs. triangular, 2.5–4 cm. long, rigid, sharply pointed, rounded above, keeled below, pale green: cones ovoid-oblong, 2.5–3.5 cm. long, with numerous suborbicular nearly entire scales tomentulose outside below the middle, spreading at maturity; bracts long-acuminate, exserted, upright. B.M.8253(c). S.S.12:t.594. M.D.1914:197, t(h). B. C. to Mont. and Ore. Intr. 1881. Zone V.

A related species is **L. Griffithiàna** Carr. Tree to 20 m., with pendulous brs.; brts. dull reddish brown: lvs. flat above, obtuse: cones oblong, 7–10 cm. long; bracts lanceolate, reflexed. B.M.8181(c). G.C.III.41:130(h). Gn.82:445(h). Himal., S. W. China. Intr. 1848. Zone VII or VIII?

3. **L. Kaèmpferi** Sarg. JAPANESE L. Tree to 30 m., with short horizontal brs.; bark scaling off in narrow strips leaving red scars; brts. yellowish or reddish brown and usually bloomy, glabrous or slightly pubescent: lvs. flattened, 1.5–3.5 cm. long, rather broad, obtuse, light or bluish green, white bands below each with 5 rows of stomata: cones ovoid, 1.5–3.5 cm. long, with numerous truncate or slightly emarginate scales; bracts concealed. S.I.1:t.2(c). W.C.t.15,16(h). (*L. leptolepis* Murr., *L. japonica* Carr.) Japan. Intr. 1861. Zone V.—One of the handsomest and most rapidly growing larches.—The dwarf form of the high mts. of Japan, var. *minor* Sarg., reverts under cult. to the normal form.

L. K. × *decidua* = **L. eurôlepis** Henry. Differs from *L. Kaempferi* chiefly in the less bloomy brts. yellow or grayish yellow the second year and in the shorter and narrower lvs. with fewer rows of stomata. Proc. Irish Acad. 35B:t.11. Trans. Scott. Arb. Soc. 29:t.15(h). (*L. Henryana* Rehd., *L. hybrida* Farquhar, not Schroed.) Orig. about 1900.

4. **L. decídua** Mill. EUROPEAN L. Tree to 35 m., with a pyramidal, later often irregular head; bark dark grayish brown; brts. slender, glabrous, yellowish: lvs. flattened, 2–3 cm. long, keeled below, soft, bright green: female fls. purple: cones ovoid, 2–3.5 cm. long, with 40–50 suborbicular scales, loosely appressed at maturity, the uppermost closing the apex; wings of seed extending to the upper margin of the scale. H.W.1:108–12,t(c). F.E.29:117 (h). M.G.23:316,317(h). (*L. europaea* DC., *L. Larix* Karst.) N. and C. Eu. Long cult. Zone (II).—Var. **péndula** Henk. & Hochst. With pendulous brs. Gt.20:t.684,f.5(h). G.C.III.3:430,t(h). (Var. *pendulina* Reg., *L. europaea* var. *p.* Laws.)

5. **L. sibírica** Ledeb. SIBERIAN L. Tree to 40 m., with straight stem and rather short ascending brs.; brts. light yellowish gray; buds brown, at base very dark to nearly black: lvs. similar to those of the preceding species, 2.5–3.5 cm. long: female fls. usually green, sometimes whitish or brownish: cones ovoid, usually 3.5 cm. long, with about 30 scales truncate or rounded and entire at the margin, finely striate and tomentulose on the back, half-spreading at maturity; seed-wings not extending to the upper margin of the scale. Gt.20:t.684,f.1–2. G.W.18:390(h). S.N.46(h). (*L. decidua* var. *s.* Reg., var. *rossica* Henk. & Hochst.) N. E. Russia to Siberia. Intr. 1806. Zone I.

6. **L. dahùrica** Turcz. DAHURIAN L. Tree to 30 m., with rather long horizontal brs. fairly regular on young, but usually irregular on old trees and wide-spreading; brts. yellowish or reddish, usually pubescent; buds yellowish brown, darker or nearly black at base: lvs. flattened, about 3 cm. long, bright green: cones ovoid, 2–2.5 cm. long, with about 20 scales or more, thin, truncate or emarginate; bracts rounded at apex, with inconspicuous mucro. Gt.20:t. 684,f.9,10. M.D.1914:191(h). (*L. Cajanderi* Mayr.) E. Siberia. Intr. 1827. Zone I?—Var. **japónica** Reg. Young brts. bluish red, often bloomy, pubescent, sometimes pale. S.I.2:t.1(c). W.C.t.17,18(h). G.W.6:499(h). (*L. kurilensis* Mayr, *L. kamtchatica* Carr.) Saghalin, Kurile Isls. Intr. 1888. Zone I.—Var. **Príncipis Rupprèchtii** Rehd. & Wils. Cones larger, to 3.5 cm. long, with 30–40 scales truncate at apex; bracts at least the lower ones more than half as long as the scales. Mayr, Fremdl. Wald & Parkb. 309. B.D. 1923:t.21(h). (*L. P. R.* Mayr.) N. China, Korea. Intr. 1903. Zone V.

7. **L. laricina** K. Koch. AMERICAN L. Tree to 20 m., with horizontal short brs. forming a narrow-pyramidal head; bark reddish brown; brts. glabrous, reddish yellow, usually bloomy; buds reddish brown: lvs. 2.5–3.5 cm. long, obtuse, light bluish green: cone globose-ovoid, 1.5–2 cm. long, with 12–15 suborbicular scales glabrous and striate outside, minutely crenulate and bevelled at the margin; bracts 1/4 as long as scale. S.S.12:t.593. Em. 106,t(c). (*L. americana* Michx., *L. microcarpa* Desf.—Tamarack, Hackmatack.) Can. s. to Pa., w. to Man. and Ill. Intr. 1737. Zone I.

L. l. × *decidua* = **L. péndula** Salisb. It differs from *L. laricina* chiefly in its larger cones about 2.5 cm. long, with 20–30 scales pubescent below the middle: brts. usually pink, rarely glaucous. Lambert, Pinus t.36(c). G.C.III.58:178(h). (*L. americana* var. *p.* Loud.) Orig. before 1800.—It has been confused with *L. laricina* and with *L. dahurica*.

20. **PSEUDÓLARIX** Gord. GOLDEN LARCH. Deciduous tree with horizontal whorled brs.: lvs. linear, spirally arranged and scattered on the long shoots, fascicled on the lateral spurs: fls. monoecious, terminal; staminate fls. catkin-like, slender-stalked and clustered on short spurs; female fls. solitary: cone ovoid, short-stalked, with ovate-lanceolate scales separating from the axis at maturity and with lanceolate bracts about half as long as scales; seeds 2 under each scale, with membranous wings nearly as long as the scale; cotyledons 5–6. (Greek *pseudos*, false, and *larix*.) Syn. *Laricopsis* Kent.—One species in China.

P. amàbilis Rehd. Tree to 40 m., with reddish brown bark, fissured into narrow scales: lvs. linear, 3–7 cm. long, 2.5–3.5 mm. broad, acuminate, soft, light green, bluish beneath: male fls. yellow, about 6 mm. long: cones ovoid, reddish brown, 6–7.5 cm. long and 4–5 cm. across; scales cordate at base, emarginate at apex, woody; seeds about 8 mm. long. B.M.8176(c). G.C.II. 19:88. Gn. 29:397(h). B.E.t.39(h). (*P. Kaempferi* Gord., *P. Fortunei* Mayr, *Larix a.* Nelson, *L. Kaempferi* Fort., not Sarg.) E. China. Intr. 1854. Zone V.—Handsome tree of broad-pyramidal habit with light green feathery foliage turning bright yellow in autumn; it dislikes limestone soil.

21. **CÉDRUS** Link. CEDAR. Tall evergreen trees with spreading irregularly arranged brs.; bark dark gray, smooth on young, fissured and scaly on old trees; buds minute, ovoid, with few scales: lvs. spirally arranged and scattered on the long shoots, densely fascicled on the spurs, acicular, usually triangular, rigid, pointed: fls. monoecious, terminal, solitary; staminate fls. cylindric, upright, about 5 cm. long; female fls. ovoid, purplish, 1–1.5 cm. long, consisting of numerous suborbicular, 2-ovuled scales subtended by

small included bracts: cone upright, ovoid to ellipsoid-oblong, with numerous closely appressed very broad scales tomentose outside, maturing the second or third year: seeds irregularly triangular, with a membranous broad wing: cotyledons 9–10. (*Kedros* is the ancient Greek name of a resinous tree.)—Four closely related species sometimes considered races of one species.

A. Leading shoot stiff, upright or spreading; brts. usually not pendulous: cones truncate, often concave at apex.
B. Brts. densely short-pubescent: lvs. as high or higher than broad, usually less than 2.5 cm. long.....1. *C. atlantica*
BB. Brts. glabrous or slightly pubescent: lvs. broader than high, usually 2.5–3 cm. long.....2. *C. libanotica*
AA. Leading shoot and brts. pendulous, densely pubescent: lvs. to 5 cm. long: cones rounded at apex.....3. *C. deodara*

1. **C. atlántica** Manetti. Atlas C. Tree to 40 m., with upright leading shoot: lvs. bluish green: cone 5–7 cm. long, about 4 cm. across; scales 3.5 cm. wide, light brown. C.B.1:69. D.J.t.10(h). G.F.9:417(h). B.D.1925:69,t.(h). (*C. Libani* var. *a.* Hook. f.) N. Afr. Intr. before 1840. Zone VI.—Var. **glaùca** Carr. Lvs. glaucous. G.C.III.76:227,t. Gg.8:275(h). Gs.1:198(h). —Var. **argéntea** Murr. Lvs. nearly silvery-white; scarcely different from the preceding.—Var. **péndula** Carr. Form with pendulous brs. and brts., sometimes nearly columnar in outline. G.C.III.66:287(h).—Var. **fastigiàta** Carr. Form of narrow-pyramidal or nearly columnar habit with ascending or upright brs. R.H.1890:32(h).

2. **C. libanótica** Link. Cedar of Lebanon. Tree to 40 m., with upright or spreading leading shoot: lvs. dark or bright green: cones 8–10 cm. long, 4–6 cm. across, brown; scales about 5 cm. wide. B.C.1:71. B.E.294.t.40(h). G.F.2:149; 8:335(h). G.C.III.34:265;71:111,233(h). (*C. Libani* Laws., *C. Cedrus* Huth, *C. effusa* Voss, *C. patula* K. Koch.) Asia Minor, Syria. Intr. 1638. Zone (V).—Beautiful and stately tree of characteristic appearance; also of interest for its scriptural and historical associations.—Var. **glaùca** Rehd. Lvs. bluish white. (*C. Libani argentea* Gord.)—Var. **nàna** Rehd. Dwarf compact, usually broad-pyramidal form, with thinner lvs. 1–2 cm. long. (*C. Libani* var. *n.* Loud.)—Var. **péndula** Rehd. Brs. pendulous: lvs. slender and rather long. (*C. Libani p.* Knight, *C. Libani* var. *Sargenti pendula* Hornibrook.)

A closely related species is **C. brevifòlia** Henry, differing chiefly in the much shorter glaucous lvs. usually 5–6 mm. long and the smaller cones, about 7 cm. long and 4 cm. wide and with a short umbo in the apical depression. B.N.328. R.H. 1920:85(h). (*C. libanotica* ssp. *b.* Holmboe, *C. Libani* var. *b.* Hook. f.) Cyprus. Intr. 1881. Zone VIII?

3. **C. deodàra** Laws. Deodar C. Tree to 50 m.: lvs. dark bluish green, 2.5–5 cm. long, as high as broad: cones 7–10 cm. long, 5–6 cm. across, reddish brown; scales 5–6 cm. wide, less tomentose. C.B.1:70. B.E.t.41(h). G.C. III.25:139; 34:400(h). (*C. Libani* var. *d.* Hook. f.) Himal. Intr. 1831. Zone VII?—Graceful tree of pyramidal outline.—Var. **argéntea** Nelson. Lvs. bluish or silvery white.—Var. **aùrea** Nelson. Lvs. yellow. G.W.11:87(h). —Var. **robústa** Carr. With stouter brs. and more rigid lvs. about 5 cm. long.

22. **PÌNUS** L. Pine. Evergreen trees with whorled spreading brs., rarely shrubby; bark furrowed or scaly; buds conspicuous, with numerous imbricated scales: lvs. of 2 kinds, the primary lvs. spirally arranged and usually reduced to small scarious bracts bearing in their axils the acicular, semiterete or triangular secondary lvs. borne on an undeveloped brt. in clusters of from 2–5, rarely as many as 8 or reduced to 1, surrounded at base by sheaths of 8–12 bud-scales; only on young seedling plants and occasionally on shoots from the old wood the primary lvs. are subulate and green: fls.

monoecious, the male fls. axillary, clustered at the base of the young shoot, catkin-like, yellow, orange or scarlet, composed of numerous spirally arranged 2-celled anthers; female fls. lateral or subterminal, consisting of numerous spirally arranged 2-ovuled scales, each subtended by a small bract: cone subglobose to cylindric, symmetrical or oblique, with woody scales closely appressed before maturity. The apex of the scales usually much thickened and the exposed part (apophysis) usually rhombic in outline, transversely keeled and in the middle usually with a prominent boss or umbo mostly terminated by a spine or prickle; in some species the apex of the scale is flat and bears the spineless umbo at the end; seeds usually with long articulate or adnate wing, rarely with short wing or wingless: cotyledons 4–15. (The ancient Latin name of the tree.) About 80 species distributed throughout the n. hemisphere from the arctic circle to Guatemala, to the W. Indies, N. Af. and the Malayan Archipelago.

The most important characters in the grouping of the species are the shape of the cone-scales and the structure of the lvs. which contain either one or 2 vascular bundles and usually 2 or more resin ducts which are either marginal (situated beneath the epidermis) or medial (enclosed by the tissue of the lf.) or internal (close to the fibro-vascular bundle); in some species the lvs. have resin-ducts of 2 kinds. The fibro-vascular bundles and the resin-ducts can easily be seen with a fairly strong lens in thin cross-sections made with a sharp razor from the middle of the lf. and placed on a glass-plate. The shoot which develops in spring (spring-shoot) from the terminal winter-bud produces in most species only one internode with one whorl of brts. and is therefore called uninodal and bears the cones at the end of the shoot (subterminal), while in other species the spring-shoot produces 2 or more, often incomplete whorls of brts. (multinodal shoots) and bears the cones partly in the middle of the shoot (lateral); occasionally summer-shoots appear at the end of uninodal shoots and change it to an incompletely multi-nodal shoot.

Sheaths of lf.-clusters deciduous; base of bracts not decurrent; lvs. with 1 fibro-vascular bundle.

A. Lvs. 5 in 1 fascicle.
  B. Lvs. serrulate.
    C. Brts. pubescent or tomentose.
      D. Lvs. without conspicuous white lines on back, dark green.
        E. Brts. tomentose: cone indehiscent.
          F. Lvs. bright green: cones 9–14 cm. long, with often recurved apophyses. 1. *P. koraiensis*
          FF. Lvs. dark green: cone 5–8 cm. long, with appressed apophyses. 2. *P. Cembra*
        EE. Brts. pubescent: cone dehiscent.
          F. Bark of trunk smooth: cone 5–10 cm. long, with thickened convex scales: lvs. 2–8 cm. long. 7. *P. parviflora*
          FF. Bark of trunk fissured: cones 12–25 cm. long, with thin appressed scales: lvs. 4–10 cm. long. 10. *P. monticola*
      DD. Lvs. with conspicuous white lines on back: cone 25–50 cm. long. 6. *P. Lambertiana*
    CC. Brts. glabrous or only slightly pubescent at first.
      D. Brts. bloomy: lvs. 14–20 cm. long. 9. *P. excelsa*
      DD. Brts. not bloomy: lvs. 7–12 cm. long.
        E. Winter-buds cylindric, chestnut-brown: cone-scales much thickened; seed wingless. 5. *P. Armandi*
        EE. Winter-buds ovoid; cone-scales thin; seeds winged.
          F. Cone-scales convex, thickish: tree with ascending brs. 8. *P. peuce*
          FF. Cone-scales thin, flat: trees with horizontal brs.
            G. Brts. pubescent at first: lvs. stiff: cones usually 12–25 cm. long. 10. *P. monticola*
            GG. Brts. glabrous or slightly puberulous: lvs. slender: cones usually 5–12 cm. long. 11. *P. strobus*
  BB. Lvs. entire: cones short-stalked.
    C. Sheaths deciduous the first year: lvs. with stomatic lines on back, rarely without, 3–7 cm. long.
      D. Cones indehiscent, 5–7 cm. long: brts. glabrous or puberulous: lvs. stout. 3. *P. albicaulis*
      DD. Cones dehiscent, 6–25 cm. long: brts. puberulous: lvs. slender, 1 mm. thick. 4. *P. flexilis*
    CC. Sheaths deciduous the 2d or 3d year: lvs. without stomatic lines on back, 2–4 cm. long.
      D. Brts. dark orange-brown, puberulous: cone-scales short-mucronate. 14. *P. Balfouriana*
      DD. Brts. light orange, glabrous or nearly so: cone-scales aristate: lvs. resin-dotted. 15. *P. aristata*

AA. Lvs. 1–4.
B. Lvs. entire, 1–4, 2–3.5 cm. long.....13. *P. cembroides*
BB. Lvs. serrulate, 3, 5–10 cm. long.....13. *P. Bungeana*

Sheaths of lf.-clusters persistent; base of bracts decurrent: lvs. with 2 fibro-vascular bundles, serrulate.

A. Lvs. usually 3, rarely 4 or 5 (partly 2 in a var. of no. 24 and in no. 38).
B. Brts. bloomy: lvs. 12–30 cm. long: cones 15–35 cm. long.
C. Lvs. bluish green.
D. Lvs. stiff, 12–18 cm. long: seed-wing membranous, much longer than seed.
25. *P. Jeffreyi*
DD. Lvs. slender, 20–30 cm long: seed with thick wing shorter than seed.
39. *P. Sabiniana*
CC. Lvs. dark green, stiff, 15–30 cm. long: seed-wing thick, longer than seed.
40. *P. Coulteri*
BB. Brts. not bloomy (sometimes sightly so in no. 27).
C. Lvs. with internal resin-ducts, 20–45 cm. long: buds large, with white-fringed scales, not resinous.....26. *P. palustris*
CC. Lvs. with medial or marginal resin-ducts: buds usually brown.
D. Lvs. 15–30 cm. long: cones deciduous, prickly.
E. Buds ovoid, acuminate, resinous: lvs. dark or yellow green, 2–5.24. *P. ponderosa*
EE. Buds oblong-ovoid, not or slightly resinous: lvs. bluish green, 3....27. *P. taeda*
DD. Lvs. 7–18 cm. long: cones persistent.
E. Lvs. dark green: tips of bud-scales slightly spreading: cone symmetrical
32. *P. rigida*
EE. Lvs. bright or bluish green, slender: tips of bud-scales appressed: cone oblique.
F. Bark on upper part of trunk and on brs. smooth: prickles of cone-scales stout.
37. *P. attenuata*
FF. Bark rough: lvs. sometimes 2: prickles of cone-scales minute.....38. *P. radiata*

AA. Lvs. 2 (partly 3 in nos. 23, 24, 28, 29, 33).
B. Spring-shoots uninodal, with only 1 whorl of brts.
C. Bark of 2-year-old brts. divided into sharply defined plates (the decurrent base of the bracts), each peeling off as a whole.
D. Brts. grayish white: winter-buds not resinous.....20. *P. leucodermis*
DD. Brts. orange to brown or grayish-yellow.
E. Winter-buds brown.
F. Young brts. not bloomy: winter-buds resinous
G. Lvs. with medial resin-ducts: conelet mucronate; cone falling off as a whole.
H. Lvs. always 2: cone with obtuse umbo.....21. *P. nigra*
HH. Lvs. often 3: cones with prickly umbo.....24. *P. ponderosa var.*
GG. Lvs. with marginal resin-ducts: conelets mutic; cone leaving a few basal scales on the stem.....16. *P. resinosa*
FF. Young brts. bloomy: winter-buds not resinous: lvs. sometimes 3.
23. P. *tabulaeformis*
EE. Winter-buds grayish white, cylindric-oblong, with conspicuously fimbriate scales.....22. *P. Thunbergii*
CC. Bark of 2-to 4-year-old brts. not conspicuously divided into plates, peeling off rather irregularly.
D. Lvs. 2–8 cm. long: cone deciduous.
E. Lvs. bluish or grayish green: cone-scales with obtuse umbo: usually a tree.
18. *P. sylvestris*
EE. Lvs. bright green: cone with a more or less prickly umbo: usually a shrub.
DD. Lvs. 7–25 cm. long. 19. *P. mugo*
E. Young brts. bloomy: lvs. slender, bright green: cone deciduous..17. *P. densiflora*
EE. Young brts. not bloomy: cones persistent.
F. Lvs. with marginal resin-ducts, 6–18 cm. long: bark formation late.
29. *P. halepensis*
FF. Lvs. with medial or internal resin-ducts, 12–25 cm. long: bark formation early.....30. *P. Pinaster*
BB. Spring-shoots multinodal, with more than one whorl of brts.: resin-ducts medial.
C. Young brts. glaucous.
D. Winter-buds not, or little, resinous: lvs. 7–12 cm. long, sometimes 3: cones deciduous
28. *P. echinata*
DD. Winter-buds resinous: lvs. 3.5–7 cm. long: cones persistent.....31. *P. virginiana*
CC. Young brts. not glaucous (sometimes slightly so in no. 30): cones persistent.
D. Resin-ducts marginal: lvs. 7–15 cm. long: umbo obtuse.....29. *P. halepensis*
DD. Resin-ducts medial.
E. Lvs. 1–7 cm. long.
F. Lvs. 1–3.5 cm. long: cone not prickly, curved.....34. *P. Banksiana*
FF. Lvs. 3–7 cm. long: cone prickly.
G. Lvs. slightly twisted, with 2–5 resin-ducts: cone symmetrical.
33. *P. pungens*
GG. Lvs. strongly twisted, with 1–2 resin-ducts: cone unsymmetrical.
35. *P. contorta*
EE. Lvs. 10–25 cm. long.
F. Winter-buds not resinous: lvs. 12–25 cm. long: cone symmetrical.
30. *P. Pinaster*
FF. Winter-buds resinous: lvs. 10–15 cm. long: cones unsymmetrical.
36. *P. muricata*

Subgen. I. HAPLOXYLON Koehne. Soft Pines. Lvs. with one fibro-vascular bundle, entire or serrulate, usually without stomata on back: bracts of lf.-fascicles not decurrent; sheaths deciduous : wood soft, with little resin.

Sect. I. Cembra. Umbo of cone-scales terminal; scales of young cone unarmed: lvs. in fascicles of 5.

Group 1. *Cembrae.* Cone indehiscent; seed wingless.

1. **P. koraiénsis** Sieb. & Zucc. Korean P. Pyramidal tree to 30 m.; bark scaly, gray-brown or gray; brts. with yellow-brown tomentum: buds oblong-ovoid, dark chestnut-brown: lvs. dark green, straight, 6–12 cm. long, serrulate: cones short-stalked, 9–14 cm. long, conic-ovoid or conic-oblong, yellow-brown; scales with recurved obtuse apex. S.Z.2:t.116(c). S.I.1:t.2(c). F.E.18:333; 25:35(h). W.C.t.6, 7(h). (*P. mandshurica* Rupr.) Japan, Korea. Intr. 1861. Zone V.—Handsome hardy pine of slow growth and dense habit.

2. **P. Cembra** L. Swiss Stone P. Tree to 25 or occasionally to 40 m., with usually short brs. forming a narrow-pyramidal, in old age often broad round-topped head; brts. densely brown-tomentose; buds globose-ovoid, acuminate: lvs. straight, 5–12 cm. long, serrulate, dark green; resin-ducts medial: cones short-stalked, ovoid, 5–8 cm. long, light brown; scales often slightly reflexed at apex. H.W.1:174–7,t.8(c). B.S.2:176,t(h). E.H.5:t.275 (h). Alps of C. Eu., N. E. Russia and N. Asia. Long cult. Zone IV.—Handsome hardy Pine of slow growth and dense habit.—Var. **columnàris** Beiss. Of columnar habit. M.G.32:34(h). G.W.2:209(h).—Var. **sibírica** Loud. Taller tree with shorter lvs. and larger cones. S.N.48, 51(h). (*P. s.* Mayr.) N. E. Russia to Siberia.

A closely related species is **P. pùmila** Reg. Shrub to 3 m., with prostrate stems: lvs. 4–7 cm. long, obscurely serrulate, with usually marginal resin-ducts: cones ovoid, 3–4.5 cm. long. S.I.2:t.1(c). G.C.III.46:193. W.C.t.8(h). N. E. Siberia, Japan. Intr. 1817. Zone III or IV?

3. **P. albicaùlis** Engelm. White-bark P. Tree to 10, rarely to 20 m., with widespreading brs., sometimes shrubby; brts. puberulous or glabrous, brown or orange, tough and flexible: lvs. rigid, 4–7 cm. long, with stomata on back, entire: cone subsessile, ovoid or globose-ovoid, 5–7 cm. long, dull purple, finally brown; scales much thickened, often with stout-pointed umbo; seeds 8–12 mm. long. S.S.11:t.548. G.C.II.24:9. E.H.5:t.276(h). B. C. to Calif. and Wyo. Intr. 1852. Zone III or IV?

Group 2. *Strobi.* Cone dehiscent: seed with long adnate wing or nearly wingless.

4. **P. fléxilis** James. Limber P. Tree to 15 or 25 m., narrow-pyramidal while young, broad and round-topped in old age; brts. pubescent, tough and pliant; buds broad-ovoid, pointed: lvs. rigid, 3–7.5 cm. long, with stomata on back, entire: cone short-stalked, ovoid to cylindric-ovoid, 7–15 cm. long, yellowish to light brown, lustrous; scales rounded at apex, with an obtuse dark umbo, the lower ones elongated and reflexed. B.M.8467(c). S.S.11:t. 546, 547. F.E.29:47(h). Alb. to Calif., w. to Mont. and w. Tex. Intr. 1861. Zone V.

5. **P. Armândi** Franch. Tree to 20 m., with widespreading horizontal brs.; brts. glabrous; buds cylindric, chestnut-brown: lvs. slender, 8–15 cm. long, serrulate, bright green: cones peduncled, conic-oblong, 10–20 cm. long, yellowish brown; scales much thickened, rounded at apex or tapering to an acute point, sometimes slightly recurved, umbo small, obtuse: seed ovoid, compressed, with a sharp edge all around. B.M.8347(c). G.C.III.33:34 (as *P. koraiensis*), 66. Gn. 85:181. R.H.1910:425(h). J.L.48:f.45(h). (*P. scipioniformis* Mast., *P. Mastersiana* Hayata.) C. and W. China, Formosa,

Korea. Intr. 1895. Zone V.—Handsome pine of rather loose habit, with widespreading brs.

6. **P. Lambertiàna** Dougl. Sugar P. Tree to 60 m., rarely taller, with spreading, somewhat pendulous brs. forming an open narrow pyramid; brts. brown, pubescent: buds oblong-obovate, apiculate: lvs. stout, 7–10 cm. long, sharply pointed, serrulate, with white lines on back: cones stalked, pendent, cylindric, 30–50 cm. long, light brown, lustrous; scales with rounded apex or tapering to a blunt slightly reflexed tip; seed about 1 cm. long, dark brown. S.S.11:t.542–3. E.H.5:t.272(h). M.G.20:126(h). Ore. to L. Calif. Intr. 1827. Zone (V).

7. **P. parviflòra** Sieb. & Zucc. Japanese White P. Tree to 30 m., with slender brs., of dense pyramidal habit; bark of young trees smooth, of older trees fissured into thin flaky scales, red-brown beneath; brts. greenish brown, puberulous or glabrous; buds ovoid, scarcely resinous, the scales free at the tips: lvs. slender, 2–8 cm. long, serrulate, bluish green, conspicuously whitened on the ventral surface: cones ovoid to oblong-ovoid, 5–10 cm. long, nearly sessile; scales abruptly convex near the apex or irregularly warped, the umbo confluent with the thin margin; seed about 1 cm. long, with short broad wing. S.Z.2:t.115(c). S.I.2:t.2(c). A.G.14:212(h). W.C.t.9,10(h). (*P. pentaphylla* Mayr.) Japan. Intr. 1861. Zone V.—As usually cult. it is grafted and forms a low tree with widespreading brs., the short usually twisted lvs. forming brush-like tufts at the end of the brts. and the rather small ovoid cones usually profusely produced; the wild form has been distinguished as var. *pentaphylla* Henry.—Var. **glauca** Beiss. has pale bluish green lvs.

8. **P. peùce** Griseb. Macedonian P. Tree to 20 m., with short ascending brs. forming a narrow dense pyramid; bark grayish brown, finally fissured into small plates; brts. greenish, glabrous; buds ovoid: lvs. straight, 7–10 cm. long, serrulate: cones short-stalked, sub-cylindric, 8–15 cm. long, tawny yellow; scales abruptly and prominently convex below the apex, with the umbo pressed against the scale beneath; seed small, with long wing. P.I.99 (c,h). B.J.59:t.13(h). B.N.345(h). (*P. excelsa* var. *p.* Beiss.) Balkan Mts. Intr. 1863. Zone IV.—Ornamental Pine of dense narrow-pyramidal habit and of slow growth.

9. **P. excélsa** Wall. Himalayan P. Tree to 50 m., of broad and open pyramidal habit; bark grayish brown, fissured into small plates; brts. bloomy, glabrous; buds cylindric-obovate, acute: lvs. slender, drooping, 10–18 cm. long, serrulate, grayish or bluish green: cones cylindric, 15–25 cm. long, tawny-yellow, on stalks 2–5 cm. long, the apophysis prominently convex, its umbo pressed against the scale beneath. P.I.69(c,h). F.E.13:t.8(h). Gn.M.6:290(h). (*P. nepalensis* Chambray.) Himal., w. to Afghan. Intr. 1827. Zone (V).—Handsome pine with widespreading brs. and drooping lvs.

10. **P. montícola** Don. Mountain White P. Tree to 30 or occasionally to 50 m., with slender brs. forming a narrow open pyramid; bark on old trees deeply divided into scaly plates, purplish; brts. yellowish or reddish brown, puberulous; buds ovoid, acute: lvs. stiff, 4–10 cm. long, serrulate, without or with few stomata on the back, bluish green: cones short-stalked, cylindric, tapering, sometimes curved, 10–25 cm. long, yellowish brown, their phyllotaxis 8/21; apophysis thin, apex sometimes slightly prolonged and reflexed. P.I.100(c,h). S.S.11:t.540–1. F.E.31:293(h). S.N.239(h). B. C. to Idaho and Calif. Intr. 1851. Zone V.—Similar to the following species, but of narrower and denser habit.

11. **P. strôbus** L. White P. Tree to 30 or occasionally 50 m., with a symmetrical pyramidal head, in old age usually broad and often very picturesque; bark thick, deeply fissured into broad scaly ridges, purplish; brts. greenish or light greenish brown, pubescent at first, soon glabrous; buds ovoid, acuminate: lvs. slender, soft, 6–14 cm. long, serrulate, bluish green: cones narrow-cylindric, often curved, 8–20 cm. long, brown, their phyllotaxis 5/13; apophysis thin. H.W.1:183–5,t.9(c). S.S.11:t.538–9. Am. For. 19: 613; 22:387; 26:223(h). Gn.M.33:352(h). (*Strobus S.* Small.) Nfd. to Man., s. to Ga., Ill. and Iowa. Intr. before 1553. Zone IV.—Important timber tree and also very ornamental.—Var. **glaûca** Beiss. Lvs. Light bluish green.—Var. **fastigiàta** Beiss. Form with ascending brs. forming a narrow-pyramidal head Gn.M.31:384(h). (Var. *pyramidalis* Hort.)—Var. **nàna** Carr. Dwarf round or somewhat conical compact bush with short lvs.—Var. **umbraculífera** Knight. Dwarf umbrella-shaped bush with short lvs. R.H.1869:38. Gn.M. 32:39(h). H.D.142,t(h). (Var. *nana* Gord., not Carr.)—Var. **prostràta** Mast. Dwarf decumbent form with diffuse trailing brs.

Sect. II. Paracembra Koehne. Cone-scales with dorsal umbo; scales of conelet mucronate or aristate: lvs. with marginal resin-ducts.

Group 3. *Cembroides.* Seed wingless: lvs. 1–4, rarely 5, entire.

12. **P. cembroìdes** Zucc. Nut P. Small tree, usually not more than 7 m. tall, with stout spreading brs. forming a round-topped head; bark shallowly fissured into large red-brown scales; brts. dark orange, pubescent at first: lvs. usually 3 or 2, slender, much incurved, 2–5 cm. long, dark green, with stomata on all sides: cone subglobose, 2.5–5 cm. broad; apophysis pyramidal, strongly keeled, lustrous brown, with broad obtuse umbo; seed oblong-obovoid, 1–2 cm. long, dark brown, with very narrow wing. Shaw, Gen. Pinus, t.13, f.130–2. Am. For. 29:159(h). S. Ariz. to L. Calif. and Mex. Intr. 1830. Zone VIII?—Var. **monophýlla** Voss. Tree to 15 m.: lvs. usually solitary, 2–3.5 cm. long, rigid, pungent, glaucous-green: cone broad-ovoid, 3.5–5 cm. long; umbo with minute incurved prickle. S.S.11:t.551. H.B.3:25 (h). S.N.264(h). (*P. m.* Torr. & Frém.) Calif. to Colo. and Ariz. Intr. 1848. Zone V.—Var. **edùlis** Voss. Tree to 15 m.: lvs. 2–3, rigid, 2–3.5 cm. long, dark green, without stomata on back: cone broad-ovoid; umbo with minute incurved tip. S.S.11:t.552. F.E.29:205(h). S.N.263(h). (*P. e.* Engelm., *Caryopitys e.* Small.) S. Wyo. to Ariz., Tex. and n. Mex. Intr. 1848. Zone V.—In cult. like the preceding, a slow-growing round bush.—Var. **Parryàna** Voss. Lvs. 3–5, usually 4, rigid, 3–4 cm. long: cone subglobose; umbo with recurved prickle. S.S.11:t.549. M.G.18:97(h). (*P. P.* Engelm.) Calif. Intr. about 1885. Zone VIII?

Group 4. *Gerardianae.* Seed with very short articulate wing: lvs. 3, serrulate.

13. **P. Bungeàna** Zucc. Lace-bark P. Tree to 25 or 30 m., with long and slender brs.; bark exfoliating in large scales, leaving particolored areas, on old trees chalky-white; brts. grayish green, glabrous: lvs. rigid, 5–10 cm. long, with stomata on back, light green: cones subsessile, conic-ovoid, 5–7 cm. long, light yellowish brown; apophysis broad, keeled, the umbo forming a spine with broad base; seed broad-ovoid, with short wing. B.M.8240(c). P.I.89(c,h). Gn.89:165(b). B.D.1923:t.18(h). N. W. China. Intr. 1846. Zone V.—Slow-growing and bushy in cult. with rather sparse light green lvs.; remarkable for its exfoliating bark.

Group 5. *Balfourianae.* Seed with long articulate wing: lvs. 5, entire, without stomata on back and with marginal resin-ducts: sheath gradually deciduous.

14. **P. Balfouriàna** Jeffr. Foxtail P. Tree to 15, occasionally to 30 m., narrow-pyramidal while young, in old age with an irregular and open head;

bark on young trees milky-white, on old trees deeply ridged, dark red-brown; brts. dark brown, puberulous at first: lvs. crowded, rigid, usually incurved, persistent for many years, 2–4 cm. long, dark green: cones short-stalked, pendulous, subcylindric, 7–12 cm. long, dark brown; apophysis tumid; umbo with short prickle. S.S.11:t.553. E.H.5:t.277(h). Calif. Intr. 1852. Zone (V).

15. **P. aristàta** Engelm. Hickory P. Bushy tree, occasionally to 15 m., sometimes a prostrate shrub; brts. glabrous or puberulous at first, light orange: lvs. stout or slender, 2–4 cm. long, dark green, usually with conspicuous whitish exudations of resin: cones cylindric-ovoid, 4–9 cm. long; apophysis tumid, umbo with slender curved spine to 8 mm. long. S.S.11:t.554. G.C. III.20:719. M.D.1904:t.5(h). Gt.74:430(h). (*P. Balfouriana* var. *a.* Engelm.) Calif. to Colo. and Ariz. Intr. 1861. Zone V.—In cult. usually a handsome low shrub with ascending brs. densely clothed with appressed lvs. sprinkled with white grains of resin.

Subgen. II. DIPLOXYLON Koehne. Lvs. with 2 fibro-vascular bundles, and with dorsal and ventral stomata, serrulate; bracts of lf.-fascicles decurrent; sheaths persistent, rarely deciduous: cones with dorsal umbo: wood hard, with dark resinous bands and clearly defined annual rings.

Sect. III. Pinaster. Lvs. with persistent sheaths; seed-wings long and articulate: spring-shoots uninodal or multinodal.

Group 6. *Lariciones.* Lvs. 2–3: spring-shoots uninodal: cones dehiscent at maturity: ray-cells of wood with large pits.

16. **P. resinòsa** Ait. Red P. Tree to 25, occasionally to 50 m., with stout spreading, sometimes pendulous brs. forming a broad pyramidal head; bark red-brown, shallowly fissured and scaly; buds ovoid, acuminate, light brown, resinous: lvs. 2, flexible, 12–17 cm. long: conelet mutic; cone subsessile, conic-ovoid, symmetrical, 4–6 cm. long, nut-brown, falling the 3d year, leaving a few basal scales on the br.; apophysis conspicuously keeled, with an obtuse small dark umbo. P.I.69(c,h). S.S.11:t.550–1. A.G.12:645(h). F.L.5:152(h). (Norway P.) N. S. to Man., s. to Pa., Mich. and Minn. Intr. 1756. Zone I.—Var. **globòsa** Rehd. Dwarf and dense form of globose habit. H.D.138,t.(h).

17. **P. densiflòra** Sieb. & Zucc. Japanese Red P. Tree to 35 m., with horizontal brs. forming an irregular, rather broad head; bark orange-red, thin, scaly; brts. orange-yellow, bloomy; buds oblong-ovoid, chestnut-brown: lvs. 2, slender, 8–12 cm. long, bright bluish green; conelets conspicuously mucronate; cones short-stalked, conic-ovoid to oblong, symmetrical, 3–5 cm. long, dull tawny-yellow; apophysis flattened, the small umbo with a short prickle or obtuse. S.Z.2:t.112(c). S.I.1:t.1(c). Gn.M.2:22(h). W.C.t.11(h). Japan. Intr. 1854. Zone IV.—Var. **aùrea** Mayr. Lvs. yellow.—Var. **òculus-draconis** Mayr. Each lf. marked with 2 yellow zones. Mayr, Abiet. Jap. t.7,f.c.-d(c).—Var. **péndula** Mayr. With pendulous or prostrate brs.—Var. **globòsa** Mayr. Dwarf globose form with short lvs.—Var. **umbraculífera** Mayr. Low form with spreading brs. forming an umbrella-like head, ultimately to 4 m. tall. H.D.134,t(h). (Var. *tabulaeformis* Hort.)

The closely related **P. Massoniàna** Lamb. differs chiefly in the longer lvs., in the partly mutic, partly tuberculate or mucronulate conelet and the sublustrous nut-brown cone. Shaw, Gen. Pinus, t.20,f.176–8. S. China.—Confused with *P. densiflora* and *P. Thunbergii;* probably not in cult. and too tender.

18. **P. sylvéstris** L. Scots P. Tree to 25, or occasionally to 40 m., with spreading brs., pyramidal when young, round-topped and irregular when old: bark red or red-brown, rather thin and smooth on the upper part of the trunk, darker and fissured below; brts. dull grayish yellow; buds oblong-

ovoid, brown, resinous: lvs. 2, rigid, usually twisted, 3–7 cm. long, bluish green: conelet reflexed, minutely mucronate; cone short-stalked, reflexed, conic-oblong, symmetrical or sometimes oblique, 3–6 cm. long, dull tawny-yellow; apophysis flat, sometimes pyramidal; umbo small, with a minute prickle or its remnant. H.W.1:121–6,t.4(c). F.E.29:157(h). E.H.3:t.160–9 (h). Eu. to Siberia. Long cult. Zone II.—One of the most important timber trees of Eu.—Var. **argéntea** Stev. Lvs. light bluish green and of silvery hue. —Var. **aûrea** Beiss. Young lvs. golden-yellow. F.E.13:t.14(h).—Var. **fastigiàta** Carr. Of columnar habit with ascending brs. (Var. *pyramidalis* Hort.)—Var. **Waterèri** Beiss. Dense columnar form with short, steel-blue lvs.—Var. **péndula** Laws. With pendulous brs.—Var. **nàna** Carr. Low dense and round bush with thick, very twisted lvs. about 2 cm. long. H.D.144,t(h). (Var. *pygmaea* Hort.)

The following are geographical varieties or races: Var. **rigénsis** Loud. Bark very red; stem straight and tall. Silviculturally the most important race.—Var. **scótica** Beiss. Bark redder: lvs. shorter, about 3.5 cm. long: cones shorter, about 3.5 cm. long.—Var. **lappònica** Fries. Of narrower pyramidal habit: lvs. broader and shorter, remaining alive for 4–7 years: cones more yellowish. Skogsvard. För. Tidskr.17:35, 37, 47(h). (*P. l.* Mayr.) N. Eu.—Var. **engadinénsis** Heer. A slow growing pyramidal form with grayish green, thick and rigid lvs. 2.5–3.5 cm. long and oblique cones with partly convex apophyses. Tyrol.

19. **P. mùgo** Turra. Mountain P. Usually low, often prostrate shrub, sometimes a pyramidal tree to 12 m.; brts. brownish: lvs. 2, crowded, stout, 3–8 cm. long, bright green: conelets mucronate; cones subsessile, ovoid or conic-ovoid, 2–7 cm. long, tawny-yellow or dark brown, lustrous; apophysis pyramidal or flattened, the umbo bordered by a dark ring and bearing the remnant of a mucro. H.W.1:140–3,t.5(c). (*P. montana* Mill.) Mts. of C. and S. Eu. Intr. 1779. Zone II.—As seen in a cross-section under the microscope the cells of the epidermis of the lf. are much higher than broad with a dash-like space in the centre, while in *P. sylvestris* the cells are about as high as broad with a dot-like space in the centre.—This very variable species is usually divided into 4 vars. of which the first is the type. Var. **mùghus** Zenari. Cone symmetrical, conic-ovoid, with usually prickly umbo, not bloomy before maturity, yellowish brown, cinnamon-brown when ripe; apophysis sharply keeled, the prickly umbo in the middle: usually a prostrate shrub. M.D.1921:t.1. (*P. montana* var. *m.* Willd., *P. m.* Scop.) E. Alps to Balkan Pen.—Var. **pumílio** Zenari. Cone symmetrical, subglobose to ovoid, glaucous and usually violet purple before maturity, yellowish or dark brown when ripe; upper part of apophysis convex, lower part concave, the umbo below the middle, impressed: usually a prostrate shrub. M.D.1912:147–148(h); 1921:t.1. (*P. montana* var. *p.* Willk., *P. mont.* var. *prostrata* Tubeuf, *P. p.* Haenke, *P. carpatica* Hort.) Alps to C. Eu. and to Balkan Pen. Here belongs var. **compacta** D. Hill, a dense globose form.—Var. **rotundàta** Hoopes. Cone oblique and asymmetrical, conic or ovoid, spreading or bent downward, with the lower and occasionally the middle scales of the outer side ending in a short and blunt, usually slightly reflexed apophysis: usually a tree to 10 m., with several stems. R.I.11:f.1128(c). (*P. montana* var. *r.* Willk., *P. obliqua* Saut.) Mts. of C. Eu., Alps.—Var. **rostràta** Hoopes. Cones asymmetrical and very oblique, conic-ovoid, 5–6 cm. long, directed downward; scales of the outer side strongly developed, the elongated pyramidal apophysis ending in a hook-like process directed toward the base of the cone: usually a tree with a

single stem, sometimes to 25 m. Shaw Gen. Pinus, t.21,f.186(cone),190(h). S.N.257(h). (*P. montana* var. *r.* Ant., var. *arborea* Tubeuf, *P. uncinata* Ramond.) Pyrenees to W. Alps.

P. m. × *sylvestris* = **P. rhaètica** Bruegg. Occasionally with the parents. (*P. digenea* Beck.)

20. **P. leucodêrmis** Ant. Tree to 20 m., of pyramidal habit; bark light gray, broken into angular plates; brts. bloomy when young, grayish white the 2d and 3d year: buds oblong-ovoid, not resinous, the scales brown with white tips or nearly grayish white: lvs. more or less incurved, 3–6 cm. long, stiff, pungent or obtusish, bright green, the vascular bundles separated by 1–2 rows (in *P. nigra* by several rows) of cells: cone ovoid, about 8 cm. long, similar to that of *P. nigra*, but yellowish or light brown, scarcely lustrous. H.W.1:158–61. R.H.1923:332(h). Gn.89:184(h). E.H.2:t.119(h). (?*P. Heldreichii* Christ, *P. nigra* var. *l.* Rehd.) Balkan Pen. Intr. 1864. Zone V.

21. **P. nígra** Arnold. Austrian P. Tree to 30, or occasionally to 50 m., with spreading brs. forming a pyramidal, in old age sometimes flat-topped, head; brts. usually light brown; buds ovoid or oblong-ovoid, light brown, resinous: lvs. stiff, 9–16 cm. long, dark green: conelets mucronate: cones subsessile, symmetrical, ovoid, 5–8 cm. long, yellowish brown, lustrous; apophysis strongly keeled; umbo usually with short prickle. C. and S. Eu., Asia Minor. Intr. 1759. Zone IV.—A variable species with several geographical vars. of which the first is identical with the type.—Var. **austríaca** Aschers. & Graebn. Tall tree with dark gray bark and a broad ovoid head; brts. grayish or yellowish brown: lvs. rigid, 8–10 cm. long, dark green. H.W.1:151(h),t.6(c). F.E.18:t.84(h). B.E.t.42(h). (*P. Laricio* var. *a.* Loud., *P. a.* Hoess, *P. nigricans* Host.) Austria to Balkan Pen.—Handsome Pine of vigorous growth. —Var. **caramánica** Rehd. Crimean P. Tree to 30 m., with long and stout ascending brs. forming a broad pyramidal head: lvs. dark green, lustrous: cones light brown, 8–10 cm. long, the upper and middle apophyses obtusely keeled. G.C.II.20:785; 21:481. E.H.2:t.116–8(h). (Var. *Pallasiana* Aschers. & Graebn., *P. Pallasiana* Lamb.) Asia Minor.—Var. **calábrica** Schneid. Corsican P. Tall tree to 50 m., with shorter ascending brs. forming a narrower head; bark gray; brts. reddish or light brown: lvs. lighter green, 10–14 cm. long, less crowded and usually curved; cone with the middle and upper apophyses obtusely keeled. R.H.1897:355, 357(h). G.C.III.4:693,705. E.H. 2:t.114(h). (Var. *Poiretiana* Aschers. & Graebn., *P. Laricio* Poir., *P. Laricio* var. *corsicana* Loud.) S. Eu.—Var. **cebennénsis** Rehd. Tree to 20 m.; brts. orange: lvs. slender, to 16 cm. long: cones 5–6 cm. long. B.E.318. (Var. *tenuifolia* Aschers. & Graebn., *P. Salzmanni* Dun., *P. monspeliensis* Salzm., *P. pyrenaica* Lapeyr.) Pyrenees and S. France.—There are also a few garden forms as var. **péndula** Rehd. with pendulous brs., var. **pýgmaea** Rehd., a dwarf globose form, and var. **prostràta** Rehd., a prostrate form.

22. **P. Thunbérgii** Parl. Japanese Black P. Tree to 30 m., with spreading, often slightly pendulous brs. forming a broad-pyramidal, often irregular head; bark blackish gray, fissured into irregular plates; brts. orange-yellow; buds oblong, whitish, not resinous, with fimbriate scales free at the tips: lvs. stout, 6–11 cm. long, sharp-pointed, bright green; conelet mucronulate; cones short-stalked, conic-ovoid, 4–6 cm. long, nut-brown; apophysis flattened, with small depressed, usually prickly umbo. S.Z.2:t.113(c). S.I.1:t.1(c). W.C.t.13,14(h). (*P. Massoniana* Sieb. & Zucc., not Lamb.) Japan. Intr. 1855.—Var. **òculus-dracònis** Mayr. Lvs. with 2 yellow zones.

23. **P. tabulaefórmis** Carr. CHINESE P. Tree to 25 m.; bark dark gray and fissured, on the limbs red; brts. pale orange or pale grayish yellow, slightly bloomy when young; buds oblong, light brown, scarcely resinous: lvs. 2–3, mostly 2, stout, 10–15 cm. long, often glaucescent: conelets mucronate; cones subsessile, ovoid, symmetrical or oblique, 4–9 cm. long, pale tawny yellow, changing to dark brown, persistent for several years; apophysis strongly keeled, with an obtuse or mucronate umbo. Shaw, Gen. Pinus, t.23, f.201–7. B.D.1923:t.20(h). S.N.34(h). (*P. sinensis* Mayr, not Lamb., *P. Henryi* Mast., *P. Wilsonii* Shaw, *P. leucosperma* Maxim., *P. funebris* Komar.) N. to W. China. Intr. 1862. Zone V.—Var. **densàta** Rehd. Lvs. usually 2, rigid: cones ovoid, 5–6 cn. long, oblique, the posterior apophyses tumid and prominent. Shaw, Gen. Pinus, t.23, f.201. (*P. d.* Mast., *P. prominens* Mast.) W. China. Intr. 1909.

A closely related species is **P. yunnanénsis** Franch. Bark broken into large plates; lvs. slenderer, 10–18, rarely to 25 cm. long, usually in 3's: cone 6–9 cm. long, with flattened apophoses. (*P. sinensis* var. *y.* Shaw.) W. China. Intr. 1909.

Group 7. *Australes.* Cones dehiscent at maturity: spring-shoots uninodal or multinodal: rays-cells of wood with small pits.

24. **P. ponderòsa** Dougl. WESTERN YELLOW P. Tree to 50 or occasionally to 75 m., with stout spreading or often pendent brs. forming a narrow-pyramidal head; bark usually cinnamon-red or dark brown to nearly black, fissured into ridges or on old trees into large plates; brts. orange-brown, fragrant when broken: buds oblong to ovoid, resinous: lvs. 2–5, usually 3, generally rigid, 12–26 cm. long, dark green: conelets mucronate; cones subsessile, often in clusters, ovoid-oblong or conic-ovoid, symmetrical, 8–15 cm. long, light reddish or yellowish brown, lustrous, usually leaving a few basal scales on the br. when falling; apophysis depressed-pyramidal or flattened, the umbo with a stout usually recurved prickle. S.S.11:t.560–1. G.C.III. 8:557(h), 569. S.N. 244, 246, 249(h). (*P. Benthamiana* Hartw.—Bull P.) B. C. to Mex., e. to S. D. and Tex. Intr. 1827. Zone V.—One of the tallest pines and most important timber trees of the W. States.—Var. **péndula** H. W. Sarg. A form with pendulous brs. G.C.II.10:37(h). G.F.1:391(h).—Var. **scopulórum** Engelm. Smaller in every part: bark nearly black, furrowed: lvs. sometimes 2, 12–16 cm. long: cones ovoid, smaller. S.S.11:t.564. S.N. 246(h). (*P. s.* Lemm.) S. D. to Mex. and Tex. Zone IV.

25. **P. Jéffreyi** Balf. JEFFREY'S P. Tree to 40 or occasionally 60 m., with short spreading or often pendent brs. forming an open or sometimes narrow-pyramidal head; bark cinnamon-red, broken into large plates; brts. bloomy; buds oblong-ovoid, not resinous: lvs. usually 3, stout, 12–20 cm. long, pale bluish green: conelets mucronate; cones conic-ovoid, 14–26 cm. long, light brown; apophysis depressed; umbo with a slender recurved prickle. B.M. 8257(c). S.S.11:t.562–3. Gn.89:329(h). G.F.5:185(h). S.N.250(h). (*P. ponderosa* var. *J.* Vasey.) Ore. to Calif. Intr. 1853. Zone V.—Distinct ornamental pine remarkable for its long pale bluish lvs.

26. **P. palùstris** Mill. LONGLEAF P. Tree to 30 or 40 m., with ascending brs. forming an oblong open head; bark light orange-brown, separating into large thin scales; brts. orange-brown; buds oblong, whitish, fringed, not resinous: lvs. 3, crowded and forming tufts at the end of the brts., 20–45 cm. long, dark green: conelet short-mucronate: cones subsessile, cylindric, 15–20 cm. long, dull brown; apophysis keeled; umbo with a short reflexed prickle. S.S.11:t.589–90. G.F.10:115(h). Am. For. 21:895(h). (*P. australis* Michx.—Southern P.) Va. to Fla. and Miss., along the coast. Intr.

1730. Zone VIII.—The most important timber tree of the S. E. States, also yielding excellent resin; brs. imported into n. cities for decoration.

27. **P. taèda** L. Loblolly P. Tree to 30 or occasionally to 55 m., with spreading brs., the upper ones ascending, forming a compact round-topped head; bark bright red-brown, fissured into scaly ridges; brts. yellowish brown, sometimes slightly bloomy; buds oblong, resinous: lvs. 3, slender but stiff, 12–25 cm. long, bright green; conelets spinulose; cones sessile, conic-ovoid, symmetrical, 6–10 cm. long, dull, pale reddish brown; apophysis distinctly keeled; umbo elongated into a stout triangular spine. S.S.11:t.577–8. F.L. 3:25,t(h). (Old Field P., Frankincense P.) N. J. to Fla. and Tex. Intr. 1713. Zone VI.—Important timber tree.

28. **P. echinàta** Mill. Short-leaf P. Tree to 40 m., with slender, often pendent brs. in regular whorls; bark light cinnamon-red, broken into large scaly plates, scaly on the brs.; brts. dark red-brown, bloomy at first: buds oblong-ovoid, brown: lvs. 2, slender, 7–12 cm. long, dark bluish green: conelet mucronate; cones short-stalked or subsessile, conic-ovoid, 4–6 cm. long, dull brown; apophysis flattened or slightly thickened along the keel; umbo elevated, with a short prickle. P.I.71(c,h). S.S.11:t.587. Am. For. 22:513(h). (*P. mitis* Michx.—Spruce P.) N. Y. to Fla. w. to Ill. and Tex. Intr. 1739. Zone V.—Handsome tree with broad ovoid head.

Group 8. *Insignes.* Cones tenaciously persistent, often serotinous (remaining closed after maturity for years); seed-wing articulate, long: ray-cells of wood with small pits.

29. **P. halepénsis** Mill. Aleppo P. Tree to 20 m., with short brs. forming an open round-topped head; bark gray, smooth for a long time; brts. slender, yellowish brown or light greenish brown; buds small, cylindric, not resinous: lvs. 2, rarely 3, slender, 6–15 cm. long, light green; conelet obscurely mucronate near the apex; cones short-stalked, spreading or deflexed, conic-ovoid, symmetrical or nearly so, 8–12 cm. long, yellowish brown, lustrous, often serotinous; apophysis flattened or depressed-pyramidal, keeled; umbo obtuse. H.W.1:162–5,t.7(c). G.W.9:469,471(h). E.H.5:t.287–8(h). (*P. alepensis* Poir., *P. pityusa* Stev.) Mediterr. Reg. Intr. 1683. Zone VIII.—Var. **brùtia** Henry. Lvs. 10–16, rarely to 20 cm. long, more rigid, darker green: cone sessile, erect, usually in whorls of 2–6, 5–11 cm. long. H.W.1:172–3. G.C.III.4:268. R.H.1867:150–1. (*P. b.* Ten., *P. pyrenaica* David, *P. eldarica* Medwed.) S. Eu., W. Asia.—Recommended for seaside planting; of little ornamental value.

30. **P. Pináster** Ait. Cluster P. Tree to 30 m., with spreading, sometimes pendent brs. forming a pyramidal head; bark deeply fissured into narrow scaly ridges; brts. bright reddish brown; buds oblong, brown, not resinous: lvs. 2, stout and rigid, 10–20 cm. long, lustrous green: conelets minutely mucronate; cones short-stalked, clustered, conic-ovoid, symmetrical or nearly so, 9–18 cm. long, light brown, lustrous, sometimes serotinous; apophysis pyramidal, conspicuously keeled with prominent prickly umbo. H.W.1:168–9. Gn.14:20;83:338(h). G.W.9:470(h). (*P. maritima* Poir.) Mediterr. Reg., near the coast. Intr. before 1660. Zone VIII.—Recommended for seaside planting.

31. **P. virginiàna** Mill. Scrub P. Bushy tree to 15 or sometimes to 30 m., with slender horizontal or pendent brs. in remote irregular whorls; bark shallowly fissured into scaly plates, smooth on the brs.; brts. bloomy; buds oblong, dark brown, very resinous, with appressed scales: lvs. 2, rigid, usually twisted, 4–8 cm. long: conelets with tapering sharp scales: cones conic-ovoid

to oblong, symmetrical, 4–6 cm. long, reddish brown, lustrous, dehiscent at maturity; apophysis somewhat elongated along the keel; umbo prominent, ending into a slender prickle. S.S.t.581. (*P. inops* Ait.—Jersey P.) N. Y. to Ga., w. to Ohio and Ala. Intr. before 1739. Zone V.—Small tree with wide-spreading brs., valuable for planting on dry and barren soil.

32. **P. rígida** Mill. Pitch P. Tree to 25 m., with horizontal brs. forming an open irregular head; bark red-brown, deeply fissured into broad scaly ridges, on young stems thin and scaly; brts. light brown; buds ovoid or oblong-ovoid, chestnut-brown: lvs. 3, rigid, spreading, 7–14 cm. long, dark green: conelets with spiny scales; cones subsessile, often clustered, conic-ovoid, symmetrical, 3–7 cm. long, light brown, lustrous, dehiscent at maturity, rarely serotinous; apophysis somewhat elevated along the keel; umbo prominent, ending in a sharp slender prickle. Add.9:t.311(c). S.S.11:t.579. G.F.4:402(h). E.H.5:t.286(h). N. B. to Ga., w. to Ont. and Ky. Intr. before 1759. Zone IV.—Valuable for planting on dry and rocky soil. Old trees are often very picturesque.—Var. **serótina** Loud. Pond P. Smaller tree, with shallowly fissured bark, lvs. to 20 cm. long and serotinous cones. S.S.11:t.580. (*P. s.* Michx.) N. J. to Fla. and Ala. Intr. 1713. Zone VIII.

33. **P. pungens** Lamb. Table Mountain P. Tree to 10, occasionally to 20 m., with stout spreading brs. forming a broad open head; bark dark brown, thick, broken into scaly plates, on upper part of trunk and on brs. separating into thin scales; brts. light orange; buds oblong, obtuse, dark chestnut-brown: lvs. 2 or sometimes 3, rigid, twisted, 3–7 cm. long, dark green: scales of conelet prolonged into an acute triangle: cones conic-ovoid, symmetrical or nearly so, 5–9 cm. long, light brown, lustrous or sublustrous; apophysis much elongated along the keel; umbo conical, ending in a stout curved spine. P.I.73(c,h). S.S.11:t.584. (Poverty P.) N. J. to Ga. and Tenn. Intr. 1804. Zone V.

34. **P. Banksiàna** Lamb. Jack P. Tree to 25 m., but usually lower, sometimes shrubby, with slender spreading brs. forming an open broad head; bark dark brown, slightly tinged with red, fissured into narrow ridges covered with thick scales; brts. purplish to yellowish brown; buds oblong-ovoid, light brown, very resinous: lvs. 2, rigid, twisted, spreading, 2–4 cm. long, acute or obtusish, bright or dark green: conelet minutely mucronate; cone erect, conic-ovoid, oblique and usually much curved, 3–5 cm. long, tawny-yellow, lustrous, serotinous; apophysis flat or convex; umbo small and unarmed. S.S.11:t.588. S.N.256(h). E.H.5:t.289(h). (*P. divaricata* Dum.-Cours.) Huds. B. to N. Y., w. to Mackenzie River and Minn. Intr. before 1783. Zone I.—For planting on dry and sandy soil.

35. **P. contórta** Dougl. Shore P. Tree to 10 m., with rather stout brs. forming a round-topped, usually dense head; bark deeply fissured into small scaly plates, dark red-brown, tinged with purple or orange; brts. light orange or orange-brown; buds ovoid, dark chestnut-brown, resinous: lvs. 2, rigid, twisted, 3–5 cm. long, acutish, dark green: conelet long-mucronate; cones sessile, conic-ovoid, very oblique, 2–5 cm. long, light yellowish brown, lustrous, serotinous; apophyses on the upper side of cone elevated; umbo dark, with a slender fragile prickle. S.S.11:t.567. G.C.II.19:45. D.J.384,t.(h, as *P. c. Murrayana*), (*P. Bolanderi* Parl.) Alaska to Calif., the var. e. to Mont. and Colo. Intr. 1855. Zone VIII or VII?—Var. **latifòlia** Engelm. Lodgepole P. A slenderer pyramidal tree to 25 or occasionally to 50 m.: lvs. 3.5–8 cm. long, lighter green: cones less oblique. S.S.11:t.518. E.H.5:t.292(h). D.J.44,t(h). (Var. *Murrayana* Engelm., *P. Murrayana* Balf., *P. Boursieri*

Carr.)—The most common coniferous tree of the n. Rocky Mts., often forming forests of great extent.

36. **P. muricàta** Don. Bishop P. Tree to 15, occasionally to 30 m., with stout brs., pyramidal while young, finally usually round-topped; bark dark brown, tinged with red, broken into scaly plates on the lower, into thin loose scales on the upper part of the trunk; brts. orange-brown; buds ovoid, dark brown, resinous: lvs. 2, rigid, usually twisted, 10–15 cm. long, dark green: scales of conelet prolonged into a triangular spine; cones sessile, usually clustered, reflexed, conic-ovoid, oblique, 5–9 cm. long, chestnut-brown, lustrous, serotinous; apophyses of the upper side of cone much larger, conical, terminated by a stout spine. S.S.11:t.585–6. G.F.10:235(h). G.C.III.45: 259(h), 60–61. B.S.1:104,t(h). (Prickle-cone P.) Calif. Intr. 1846. Zone VII?—Handsome pine of regular pyramidal habit.

37. **P. attenuàta** Lemm. Knob-cone P. Tree to 10, occasionally to 30 m., with slender horizontal brs. ascending at the ends; bark at base of trunk dark brown, shallowly fissured into large loose scales, smooth and pale brown above; brts. dark orange-brown; buds oblong-ovoid, dark brown: lvs. 3, rarely 2, slender, 7–18 cm. long, pale yellowish or bluish green: scales of conelet prolonged into a triangular spine; cones short-stalked, usually clustered, oblique, conic-oblong, reflexed, 8–15 cm. long, tawny-yellow, lustrous, serotinous; apophyses on the upper side of cone prominent, conical, ending in a small incurved spine. S.S.11:t.575–6. G.C.II.24:784(h),785. For. & Irr. 8:246(h). (*P. tuberculata* Gord., not Don, *P. californica* Hartw., not Lois.) Ore. to Calif. Intr. 1847. Zone VIII.

38. **P. radiàta** Don. Monterey P. Tree to 30 m., with stout spreading brs. forming an irregular open head; bark of brs. and upper trunk rough, deeply furrowed below into broad scaly ridges, dark red-brown; brts. brown; buds ovoid, bright chestnut-brown: lvs. 2 or 3, slender, 10–15 cm. long, bright green; conelet mucronate; cones short-stalked or sessile, clustered, reflexed, conic-ovoid, oblique, 7–14 cm. long, nut-brown, lustrous, serotinous; apophyses of the upper side of cone prominent, rounded, with minute prickle. S.S.11:t.573–4. G.C.III.9:341. E.H.5:t.282–4(h). Gn.87:264(h). (*P. insignis* Dougl., *P. montereyensis* Hort.) S. Calif. Intr. 1833. Zone VIII.—Handsome pine with bright green lvs., of rapid growth when young.

Group 9. *Macrocarpae.* Wing-blades of seed thick; cone large: lvs. 3–5, long: ray-cells of wood with small pits.

39. **P. Sabiniàna** Dougl. Digger P. Tree to 15 or occasionally to 25 m., with short crooked brs. forming a round-topped head; bark dark brown, thick, deeply fissured into scaly ridges; brts. bloomy: lvs. 3, rather slender, 20–30 cm. long, pale bluish green: conelet large, the scales tapering to a sharp point; cones stalked, reflexed, ovoid, slightly oblique, 15–25 cm. long, red-brown, persistent; apophysis prominent, conical, sharply keeled, tapering into the umbo and ending in a sharp point; seed-wing very thick; not uniformly colored on the dorsal surface. S.S.11:t.569. G.C.III.4:43; 5:45(h). E.H.5: t.280(h). Calif. Intr. 1832. Zone VI.—Very distinct pine of loose habit and with sparse and long pale lvs.

A related species is **P. Torreyàna** Carr. Soledad P. Tree to 15 or in cult. to 30 m.: lvs. 5, dark green: cone 10–15 cm. long; nut spotted. S.S.11:557–8. B.E.t.43(h). S.N.242(h). S. Calif. Intr. 1853. Zone VIII?

40. **P. Coùlteri** Don. Tree to 25 m., with stout brs. forming an open pyramidal head; bark dark brown or nearly black, deeply fissured into rounded scaly ridges; brts. bloomy; buds oblong-ovoid, resinous: lvs. 3, very stout, 15–20 cm. long, dark bluish green: conelet very large, scales tapering to a

long sharp point; cones reflexed, ovoid or oblong-ovoid, somewhat oblique, 25–35 cm. long, yellowish brown, persistent; apophysis elongated, pyramidal, with a large umbo forming a stout curved spine; seeds long-winged. S.S.11: t.571–2. G.C.III.4:765(h). E.H.5:t.279(h). (*P. macrocarpa* Lindl.) Calif. Intr. 1832. Zone VIII?—Tree of loose habit with sparse foliage.

4. GNETACEAE Lindl. GNETUM FAMILY

Trees or shrubs, upright, climbing or prostrate, without resin-ducts in the stem; secondary wood with true vessels: lvs. opposite, rarely whorled, large or reduced to scales: fls. dioecious, rarely monoecious or imperfectly hermaphrodite; perianth simple, 2–4-parted; stamens, 2–8; female fls. consisting of an upright orthotropous ovule with 1 or 2 integuments: fr. fleshy or winged; cotyledons 2. Includ. Ephedraceae.—Three genera in the tropics of both hemispheres; in the n. hemisphere extending to the temp. regions.

ÉPHEDRA L. Upright, climbing or decumbent much-branched shrubs; brts. green, with distant opposite or whorled lvs. more or less connate at base and usually reduced to membranous sheaths: fls. dioecious, rarely monoecious, in axillary infl., the staminate with a 2–4-lobed perianth and 2–8 stamens connate into a column with sessile or stipitate anthers, borne in the axils of bracts and forming a subglobose or oblong spike; female fls. 1–3, with 2–many bracts at base, each fl. consisting of a naked ovule enclosed by an urceolate integument (also called perianth) contracted at the apex into a more or less elongated tube, the tubillus, which has the appearance of a style: seed with leathery integument, globose-ovoid to cylindric, enclosed by the bracts which are either membranous and wing-like or form a berry-like syncarp. (Ancient Greek name, possibly of the horse-tail.) About 30 species in arid regions of S. Eu., N. Afr., W. and C. Asia, N. and S. Am.—Shrubs of very peculiar and distinct appearance with brs. resembling those of the horse-tail (Equisetum). Rarely cult; they may be used as a ground-cover in arid regions and on dry slopes; of evergreen appearance on account of their numerous usually green brs. The red berry-like fr. is ornamental, but rarely produced in cult.—Monograph by Stapf, Arten Gatt. Ephedra (in Denkschr. Math.-Nat. Cl. Akad. Wiss. Wien, LVI. 1899), cited below as Stapf.

A. Lvs. ternate or occasionally 2: fr. dry, with winged bracts.....1. *E. trifurca*
AA. Lvs. opposite or occasionally 3–4: fr. fleshy, bracts not winged.
B. Habit climbing or prostrate.
C. Lvs., at least the upper ones subulate, to 3 cm. long.....2. *E. foliata*
CC. Lvs. reduced to scales or a membranous sheath.....3. *E. fragilis*
BB. Habit upright or sometimes prostrate at base.
C. Brts. stout, 2–3 mm. thick.....4. *E. intermedia*
CC. Brts. slender, 1–2 mm. thick.
D. Bracts of fr. not margined.
E. Female spikes usually 2-fld.
F. Staminate spikes with 4–8 pairs of fls.....5. *E. distachya*
FF. Staminate spikes with 3–4 pairs of fls.....6. *E. Gerardiana*
EE. Female spikes 1-fld.
F. Inner bracts of female spikes ⅓ connate.....7. *E. major*
FF. Inner bracts of female spike ⅔ connate.....8. *E. equisetina*
DD. Bracts of fr. margined.....9. *E. viridis*

1. **E. trifúrca** Torr. Upright much-branched shrub, 0.5–1.5 m. high, with rigid and spinescent, pale green or glaucescent, rather smooth brts.: lvs. scale-like, acuminate, 6–12 mm. long, ½–⅔ connate, conspicuous, becoming shreddy: male spikes short-stalked, with about 5 whorls of ovate bracts: female spikes nearly sessile, 1-fld. with 8–10 whorls of thin winged bracts: fr. 1–1.5 cm. long, with solitary smooth, 4-sided seed and large scarious bracts. A.I.1:78. Colo. to Calif. and Tex. Cult. 1897. Zone VIII?

Related species are: **E. Torreyàna** S. Wats. Shrub to 1 m.; brts. not spinescent, sometimes flexuose: lvs. 2–3 mm. long: staminate spikes with 6–7 whorls of spikes: female spikes short-stalked, 1–2-, rarely 3-fld., with 5–6 whorls of bracts: fr. about 1 cm. long. Stapf, t.1, f.7. Colo. to N. Mex. and Utah. Cult. 1912. Zone VII or VIII?—**E. Przewálskii** Stapf. Shrub to 1.5 m., with usually whorled yellowish green rigid scabrous brts.: lvs. ternate or opposite: male spikes sessile, with 4–6 whorls or pairs of fls.; female spikes 2–3-fld., with about 5 whorls of bracts, thickened on back and incurved at apex, with broad erose wing: fr. 5–6 mm. long. Stapf, t.1, f.4. C. Asia. Cult. 1912. Zone V?—**E. califórnica** S. Wats. Prostrate or ascendent shrub with rather thick yellowish green smooth brts.; male spikes with 4–5 whorls of fls.; female spikes short-stalked, 1-fld. with 4–6 whorls of narrow-margined entire bracts; fr. 8–9 mm. long, with subglobose or broad-ovoid black seeds. A.I.1:78. Stapf, t.1, f.8. Calif. Cult. 1899. Zone VIII?

2. **E. foliàta** C. A. Mey. Shrub, climbing to 5 m., or prostrate; brts. flexuose, bright green or glaucescent, striate; internodes to 8 cm. long; buds minute: lvs. 2 or 3–4, subulate, to 3 cm. long, green, connate at base: male spikes clustered, rarely solitary, ovoid, obtusely 4-angled, with 4–12 pairs of fls.; female spikes in lax or dense cymes, 2- or rarely 3-fld., with usually 3 pairs of bracts, the outer ⅓, the inner ⅔ connate: fr. globose, 6 mm. long, red or whitish. Stapf, t.2, f.10. S.N.182(h). (*E. kokanica* Reg.) Persia, Turkestan, Arabia. Cult. 1895. Zone VII?

The closely related **E. altíssima** Desf. from N. Afr., climbing to 8 m., with the male spikes paniculate and with 2–6 pairs of fls., is probably too tender for our area. B.M.7670(c). G.C.III.7:792. Intr. 1823.

3. **E. frágilis** Desf. Upright shrub, rarely tree-like, or climbing, sometimes prostrate; brts. dark green, striate, fragile, straight or flexuose, to 4 mm. thick; lvs. 1–2 mm. long, ½–¾ connate: male spikes glomerulate, sessile or short-stalked, with 4–8 pairs of fls., anthers usually 6; female spikes usually solitary, short-stalked, 1–2-fld., with 2–3 pairs of bracts, the lower ⅓, the upper ¾ connate: fr. 8–9 mm. long, red; seed ovoid. Stapf, t.2, f.12. Mediterr. Reg. Cult. ?.—Var. **campylópoda** Stapf. More or less climbing; brts. slenderer, 2–3 mm. thick, less fragile: female spikes 2-fld. C. A. Meyer, Ephedra,t.2. M.G.33:138(h). (*E. c.* C. A. Mey.) Cult. 1912. Zone VIII.

4. **E. intermèdia** Schrenk & Mey. Densely branched upright shrub, or prostrate and ascending; brts. yellowish green or glaucous, striate, smooth or scabrous, internodes to 6 cm. long: lvs. 2, rarely 3–4, scale-like, scarious, ⅔ connate, 2–4, rarely to 6 mm. long: fls. sometimes monoecious; male spikes glomerulate, ovoid or obovoid, with 3–4 pairs of fls.; female spikes solitary, stalked, 2–3-fld., with 2–3 pairs of bracts ½–⅔ connate: fr. 6–7 mm. long, red; seeds slightly exserted. Stapf, t.2, f.15. C. Asia. Cult. 1902. Zone VI or VII?

A related species is **E. pachýclada** Boiss. Upright shrub with rigid scabrous glaucous brts.: female spikes 1–2-fld., with about 3 pairs of bracts connate only at base or the inner ⅓: fr. 7–8 mm. long; seed much exserted. Stapf, t.2, f.14. C. Asia. Cult. 1899. Zone VIII?

5. **E. distáchya** L. Low, usually procumbent shrub with rather rigid, dark green, finely striate upright brts.; internodes to 5 cm. long: lvs. scale-like, scarcely longer than 2 mm., ⅔ connate: female spikes 2, stalked, with 3–4 pairs of bracts, the outer to ⅓, the inner to ½ connate: fr. globose, red, 6–7 mm. long; seed slightly exserted. R.I.11:t.539(c). S.N.181. S. Eu., N. Asia. Cult. 1570. Zone V.—Var. **monostáchya** Stapf. Very low; staminate spikes solitary. Intr. 1772.—Var. **helvética** Hegi. Tubillus of the integument spirally twisted. Stapf, t.2, f.16. (*E. h.* C. A. Mey.) Cult. 1896.

6. **E. Gerardiàna** Wall. Usually very low; brts. slender, dark green, finely striate: lvs. scale-like, scarcely 2 mm. long, connate about ½: staminate spikes 1–2, sessile, globose-ovoid, with 3–4 pairs of fls.; female spikes solitary,

sessile or stalked, with 3–4 pairs of bracts, ¼–⅓ connate: fr. globose, 5–7 mm. long; seeds 1–2, exserted. Stapf, t.3, f.18. M.G.33:138(h). Himal., S. W. China. Cult. 1896. Zone V or VI. The typical form scarcely exceeds 5 cm. in height.—Var. **saxátilis** Stapf. Taller, ascending.—Var. **sikkiménsis** Stapf. Upright robust shrub; brts. to 15 cm. long. Intr. about 1915. Zone VII?

7. **E. màjor** Host. Upright, rarely ascending shrub, to 2 m., densely branched; brts. dark green, finely striate; internodes to 2 cm. long, partly disarticulating in winter: lvs. scale-like, not exceeding 3 mm., scarious, ⅔ or more connate: male spikes 1–3, subglobose, with 2–4 pairs of fls.; female spikes 1–3, short-stalked, 1-fld., with 2, rarely 3 pairs of bracts connate about ⅓: fr. 5–7 mm. long, red. Stapf, t.3, f.20. S.N.131(h). (*E. nebrodensis* Tineo.) Mediterr. Reg. to Himal. Intr. 1750. Zone VI.—Var. **procèra** Aschers. & Graebn. Brts. quite smooth: fr. more elongated. C. A. Meyer, Ephedra, t.4. (*E. p.* Fisch. & Mey.)

8. **E. equisetîna** Bge. Upright or ascending shrub to 2 m., with rigid brts. grayish green or glaucous, smooth or slightly scabrid: lvs. connate about ½, the free part triangular, about 2 mm. long: male spikes 1–3, sessile, with 2–4 pairs of fls.; female spikes subsessile, with 2–3 pairs of bracts, the lower connate ⅓, the upper ⅔: fr. subglobose, 6–7 mm. long; seed ovoid, scarcely exserted. Stapf, t.3, f.21. Turkestan to Mong. and N. China. Intr. 1909. Zone V.

9. **E. víridis** Cov. Upright shrub with rather crowded erect rigid brs.; brts. bright green, finely striate, somewhat scabrous: lvs. subulate, 4–7 mm. long, green, connate at base, the lower ones sometimes reduced to scarious sheaths: male spikes sessile, usually several, with 3–4 pairs of fls.; stamens 6–8; female spikes short-stalked, usually 2-fld., with 3–5 pairs of ovate acute bracts: fr. 7–8 mm. long, with usually 2 sharply angled, much exserted seeds; bracts slightly fleshy, reddish, nearly free. A.I.1:77. Calif. to Colo. and Ariz. Cult. 1906. Zone VIII?

The closely related **E. nevadénsis** S. Wats, has spreading brs. and glaucous brts.: fr. with smaller and shorter seed and broader bracts. A.I.1:78. Nev. to Calif. Cult. 1894. Zone VIII?—Another related species is **E. americàna** Humb. & Bonpl. Brts. with 3–9 internodes: lvs. usually more connate, sometimes subulate and to 1 cm. long: anthers sessile; female spikes 1–2-fld.: fr. 5–8 mm. long; seed brown, enclosed or slightly exserted. Stapf,t.3,f.25,26. Andes: Ecuador to Patagonia. Cult. 1896. Zone VIII?—Var. **andina** Stapf. Low shrub from the high Andes of Chile. Cult. 1896. Zone VII or VIII?

Subdivision II. **ANGIOSPERMAE** Brongn. ANGIOSPERMS

Ovules borne in a closed ovary which at maturity becomes the fruit.

Class I. **MONOCOTYLEDONEAE** Juss. MONOCOTYLEDONS

Stems without central pith or annular layers: embryo with a single cotyledon, the first lvs. always alternate; lvs. mostly parallel-veined: parts of the fl. usually in threes or sixes, never in fives.

5. **GRAMINEAE** Juss. GRASS FAMILY

Herbaceous, sometimes shrubby or tree-like plants, with usually hollow stem (culm): lvs. alternate, 2-ranked, consisting of a sheath enveloping the stem and usually open on one side, and a parallel-veined usually linear blade,

at the junction of blade and sheath inside a membranous appendage (ligula): fls. perfect, rarely unisexual, naked or with a perianth of 1–2 minute scales, borne in spikelets forming panicles, spikes or racemes; each spikelet consisting of 3 or more 2-ranked scales, the first 1–6, usually 2, are empty and are called glumes (or empty glumes), the others are called lemmas (lower paleas) or fertile glumes each bearing a fl. in its axil; the fl. is subtended and usually enveloped by a bract (palea or upper palea) with its back to the axis and bears usually 2 small scales or lodicules at the base; stamens usually 3, rarely 1, 2 or 6, exserted; pistil with a 1-celled, 1-ovuled ovary and usually 2 styles with mostly plumose stigmas: fr. a nutlet (caryopsis) with a starchy endosperm and a small embryo. Syn.: *Poaceae* R. Br.—About 400 genera with more than 5000 species distributed all over the earth. Divided into many subfamilies of which only the following is of interest to us:

Subfam. **Bambuseae**. Stems woody, at least at the base: leaf-blade often constricted into a distinct petiole, finally separating from the sheath: spikelets usually many-fld., rarely 1-fld.; glumes many-nerved, usually not aristate. About 250 species chiefly in the Tropics and Subtropics.—Most species bloom but rarely and many die after flowering, only some of the smaller kinds flower every year; of many species the flowers are yet unknown. Therefore in following keys and the specific descriptions the floral characters have been omitted, as they are of little practical value for the determination of the cultivated species. The most recent work which may be consulted for detailed descriptions is E. G. Camus, Les Bambusées (1913), with an atlas of 101 plates (cited below as "Camus"). A work with 15 colored plates, Icones of the Bamboos of Japan by Makino & Shirasawa is cited below as "Bamb. Jap."—Sometimes *Arundo* and *Phragmites* belonging to the Subfam. *Festuceae* are included among the woody Gramineae, but their stems, though tall and stout and nearly woody at maturity, are annual.

A. Culm terete: sheaths persistent: glume few-nerved: style very short, with 2–3 stigmas.
  B. Brts. solitary at the nodes: usually low and bushy plants of tufted habit; culms green: stamens usually 6 ..... 1. *Sasa*
  BB. Brts. usually fascicled at the nodes; tall shrubs, with the stems often spaced: stamens 3 ..... 2. *Arundinaria*
AA. Culms more or less flattened on one side: sheaths early deciduous: stamens 3; styles slender, with usually 3 stigmas ..... 3. *Phyllostachys*

1. **SÁSA** Mak. & Shibata. Low or medium-sized shrubs, often suffruticose, with creeping rootstock; culms not spotted, upright, terete, fistulose, with one br. at each node, rarely several: nodes not prominent; sheaths persistent: lvs. usually rather large, crowded at the end of the brs., tessellate: fls. in lax panicles; spikelets narrow, compressed, 3–13-fld.; glumes 2, small; lemma usually larger than the glumes, not keeled, many-nerved, tessellate; palea shorter than the lemma, 2-keeled, the keels hispid, often bifid; stamens 6, sometimes 3, exserted; ovary glabrous; style short, with 3 stigmas: caryopsis oblong, often grooved at base, slightly exceeding the lemma. (The Japanese name for the small bamboos.) About 20 species in E. Asia and the Philippines.

A. Lvs. 2–10 cm. wide, with 6–18 pairs of veins.
  B. Pairs of veins 15–18; stem-sheaths with involute margins, loosely appressed. 1. *S. tessellata*
  BB. Pairs of veins 5–13; stem-sheaths convolute, firmly appressed.
    C. Stem-sheaths smooth; stems low, rarely 2 m. tall.
      D. Ligula glabrous; lvs. 7–8 cm. broad ..... 2. *S. senanensis*
      DD. Ligula with brown hairs: lvs. 3–6 cm. broad, discoloring in autumn along the margin ..... 3. *S. Veitchii*
    CC. Stem-sheaths rough with ascending bristly hairs: stems to 4 m. tall: lvs. 2–5 cm. broad: stamens 3 ..... 4. *S. japonica*

AA. Lvs. 0.5–2, rarely to 3 cm. broad, with 2–6 pairs of veins.
B. Lvs. glabrous; stems to 2 m. tall ..... 5. *S. chrysantha*
BB. Lvs. pubescent, at least beneath, stems 0.15–1 m. tall.
C. Arrangement of lvs. distichous; lvs. small, 5–8 mm. broad ..... 6. *S. disticha*
CC. Arrangement of lvs. not distichous.
D. Lvs. green.
E. Lvs. 7–10 cm. long: height 15–25 cm ..... 7. *S. pygmaea*
EE. Lvs. 10–15 cm. long: height 0.25–1 m.
F. Stem with waxy bloom; the sheaths with a conspicuous ring of hairs at base: lvs. bright green ..... 8. *S. pumila*
FF. Stem without waxy bloom; sheaths without ring of hairs: lvs. pale green. 9. *S. humilis*
DD. Lvs. variegated.
E. Lvs. striped with white, glabrous above ..... 10. *S. variegata*
EE. Lvs. striped with yellow, soft-pubescent on both surfaces ..... 11. *S. auricoma*

1. **S. tessellâta** Mak. & Shib. Stems to 1.5 m. tall, slightly fistulose, soon arching; nodes 3–8 cm. distant; stem-sheaths persisting, each clasping also parts of the 2 or 3 sheaths above it, ciliate: lvs. to 45 cm. long and to 10 cm. broad, long-pointed, abruptly contracted at the base, sharply serrate, light green above, glaucous beneath and minutely pubescent, hairy on one side of the yellow midrib toward the base, with 15–18 pairs of veins, tessellate. G.C.III.18:189(h). Camus, t.3,f.B,t.7,f.B. B.S.1:78,t(h). (*Arundinaria t.* Bean, not Munro, *A. Ragumowski* Pfitzer.) Japan. Intr. before 1845. Zone VI.—Striking on account of its large lvs. forming broad rounded masses.

2. **S. senanénsis** Rehd. Stems to 2 m., waxy, particularly below the nodes, hollow; nodes 12–15 cm. distant; stem-sheaths terminated by a deciduous lanceolate, strongly tessellated, ciliate tongue; lvs. 15–32 cm. long, 7–8 cm. broad, long-pointed, abruptly contracted at base, serrulate, bright green and lustrous above, glaucous beneath and minutely puberulous, with 7–13 pairs of veins, minutely tessellate. Camus, t.2,C,D. Bamb. Jap. t.11,f.7–15. (*Arundinaria kurilensis* **v.** *paniculata* **F. Schmidt,** *Bambusa s.* Franch. & Sav., *S. paniculata* Mak. & Shib.) Japan. Cult. 1913. Zone VI.—Var. **nebulòsa** Rehd. Stems tinged with purple; sheaths of the brts. with small brown spots. G.C.III.35:280,t.(h). Gn.49:59(h). B.S.1:218.t(h). (*Arundinaria paniculata* var. *n.* Mak., *A. palmata* Bean, *B. metallica* Mitf.) Intr. about 1889.—Handsome bamboo spreading by suckers.

3. **S. Veìtchii** Rehd. Stems 0.5, rarely to 1.2 m. tall, green, narrow-fistulose; nodes 8–12 cm. distant; stem-sheaths persistent, pubescent at first; leaf-sheaths with tufts of bristles at apex; lvs. 10–20 cm. long, 3–6 cm. broad, rather abruptly long-pointed, abruptly contracted at the base, dark green above, glaucous and minutely pubescent beneath, turning yellow along the margin in autumn, midrib yellow beneath, with 6–9 pairs of veins. Bamb. Jap. t.11,f.21–27(c). (*S. albo-marginata* Mak. & Shib., *Bambusa V.* Carr., *Arundinaria V.* N. E. Br.) Japan. Intr. 1880. Zone VI.—Forms dense patches and spreads rapidly; the discolored edges of the lvs. give it an injured appearance in autumn.

4. **S. japónica** Mak. Stems to 2 or 3, rarely to 5 m. tall, stout; stem-sheaths covered at first with compressed bristles, soon turning pale brown, very persistent, terminated by a persistent awl-shaped tongue to 7 cm. long; lvs. 8–24 cm. long and 2–4 cm. wide, long-pointed, narrowed at base, serrulate on one margin, lustrous dark green above, glaucescent beneath except a green strip on one margin, with 6–10 pairs of veins, minutely tessellated. G.C.III.18:185(h). Gs.3:38(h). Bamb. Jap. t.4,f.1–3,t.13,f.4(c). Camus, t.5,f.a,t.13,f.a. (*Arundinaria j.* Sieb. & Zucc., *Bambusa metake* Sieb.) Japan. Intr. 1850. Zone VI.

5. **S. chrysántha** E. G. Camus. Stems 0.5–2 m. tall, hollow; nodes 5–12 cm. distant; brts. several at one node; stem-sheaths ciliate on one margin:

lvs. 8–12 cm. long, 1.2–2 cm. broad, rather abruptly long-pointed, rounded at base, bright green above or often more or less variegated with yellow, glabrous, with 4–6 pairs of veins. (*Arundinaria c.* Mitf.) Japan. Intr. 1892. Zone VI.—Spreading rapidly; of little ornamental value.

6. **S. dísticha** E. G. Camus. Stems slender, 25–75 cm. tall, zigzag, hollow, green; nodes 3–8 cm. distant; stem-sheaths pubescent at first, ciliate: lvs. distichous, 2–6 cm. long, 5–8 mm. broad, slender-pointed, narrowed into a short petiole, setosely serrulate, bright green on both sides, with 2–3 pairs of veins. (*Bambusa d.* Mitf., *Arundinaria variabilis* var. *d.* Houzeau de Lahaie, *Bambusa nana* Hort., not Roxb., *B. Vilmorini* Latour-Marliac.) Japan. Intr. before 1870. Zone VI?

7. **S. pygmaèa** E. G. Camus. Stems 30–60 cm. tall, slender, narrow-fistulose, bright green, much-branched: lvs. 5–12 cm. long, 0.8–2.5 cm. broad, rather abruptly long-pointed, rounded at base, bright green and sparingly hairy above, more densely beneath, with 3–5 pairs of veins. Bamb. Jap. t.6,f.5–6. Camus, t.5,B. (*Arundinaria p.* Mitf., *S. variegata* var. *p.* E. G. Camus.) Japan. Cult. 1896. Zone VI?—Spreading rapidly and forming a dense carpet.

8. **S. pùmila** E. G. Camus. Stems slender, 30–60 cm. tall, fistulose; stem-sheaths tessellate, the upper ones tinged with purple; lvs. 7–15 cm. long, 0.8–2 cm. broad, usually abruptly long-pointed, rounded at base, serrulate, bright green, slightly hairy on both sides, with 4–5 pairs of veins. Camus, t.7,f.a. (*Arundinaria p.* Mitf., *A. variabilis* var. *p.* Houzeau de Lahaie.) Japan. Cult. 1896. Zone VI.

9. **S. húmilis** E. G. Camus. Stems 0.5–1 m. tall, very slender, narrowly fistulose, green, with usually 2 or 3 branches at one node, long in proportion to the stem; stem-sheaths purplish at first; leaf-sheaths with 2 clusters of bristles at the apex: lvs. 10–15 cm. long, 0.8–2 cm. broad, long-pointed, rounded at the base, scarcely hairy, pale green, with 3–5 pairs of veins. Camus, t.5,f.D. (*Arundinaria h.* Mitf. *A. Fortunei viridis* Hort., *A. gracilis* Hort.) Jap. Cult. 1896. Zone VII?

10. **S. variegàta** E. G. Camus. Stems 0.3–1 m. tall, very slender, narrowly fistulose, somewhat zigzag: lvs. 8–15 cm. long, 0.8–2 cm. broad, abruptly long-pointed, rounded at base, serrulate, green, striped with white, hairy on both sides; with 3–5 pairs of veins. F.S.15,t.1535(c). (*Arundinaria v.* Mak., *A. Fortunei* Riv., *Bambusa v.* Sieb.) Jap. Intr. before 1863. Zone VI?—Spreading rapidly, forming large tufts.

11. **S. aurícoma** E. G. Camus. Stems tufted, 0.6–1.2 m. tall, slender, dark purplish green, narrowly fistulose; stem-sheaths ciliate: lvs. 8–20 cm., 0.8–3 cm. broad, rather abruptly long-pointed, rounded at base, serrulate, striped green and golden yellow, minutely pubescent above, soft-pubescent below; with 5–6 pairs of veins. I.H.19:t.108(c). (*Arundinaria a.* Mitf., *A. variegata* var. *viridi-striata* Mak., *Bambusa Fortunei aurea* Hort.) Jap. Intr. before 1870. Zone VI?

2. **ARUNDINÀRIA** Michx. Shrubs to 10, or rarely to 15 m.; root-stock caespitose or creeping; stems upright or arching, rarely climbing, with prominent nodes, sometimes spiny: branches usually several at each node: lvs. usually small, mostly tessellate: fls. in panicles or racemes; spikelets 1–many-fld., compressed; glumes 2, unequal; lemma many-nerved; palea usually much shorter, with 2 prominent keels; stamen 3 (6 in some climbing species); ovary often pubescent; style short with 2–3 stigmas: caryopsis ovoid or oblong,

grooved on the back, usually inclosed by the persistent lemma and palea. (Derived from Arundo, cane.)—About 85 species in Asia and America, including *Thamnocalamus* Falconer.

A. Stems green or yellow: lvs. 10–30 cm. long.
B. Lvs. rounded or broadly cuneate at the base, usually with bristles at the apex of the sheaths.
C. Lvs. green and usually pubescent beneath, with 6–14 pairs of veins. 1. *A. macrosperma*
CC. Lvs. glaucescent, at least on one side of the midrib and glabrous beneath, with 4–7 pairs of veins. 2. *A. Simoni*
BB. Lvs. gradually narrowed at the base, 0.5–2 cm. broad: brs. upright. 3. *A. Hindsii*
AA. Stems purple or purplish.
B. Lvs. 10–18 cm. long; stems stout, strictly upright. 4. *A. fastuosa*
BB Lvs. 3.5–10 cm. long; stem slender. arching.
C. Stems brownish: lvs. narrowed at the base. 5. *A. nitida*
CC. Stems purple: lvs. rounded at the base. 6. *A. anceps*

1. A. macrospérma Michx. Cane Reed. Stems upright, to 9 m., with numerous short divergent branches: lvs. 10–30 cm. long, 2–3 cm. broad, rounded at the base, denticulate, glabrous or pubescent, with 6–14 pairs of veins: fls. on old stems on leafy brs.; spikelets 3.5–7 cm. long, many-fld. B.B.1: 295. Camus, Monog. t.14,f.C. (*Miegia gigantea* Nutt.) Va. to Fla., west to Ohio and La., along river banks. Intr. ? Zone VI.

The closely related **A. tecta** Muhlb. (*A. macrosperma* var. *tecta* Nees), from Md. and Ind. to Texas is smaller, only 1–4 m. tall and the fls. appear on leafless shoots of the year. In **A. tecta** var. **decídua** Beadle the lvs. turn yellow in autumn and drop.

2. A. Simòni Riv. Stems to 8 m. tall, very hollow, 2–3 cm. thick at the base, the outer stems arching outward; root-stock creeping; stem-sheaths to 25 cm. long, purplish when young, rather persistent: lvs. 8–30 cm. long, 0.8–3 cm. broad, long-pointed, broadly cuneate at the base, bright green above, often striped white or whitish, glaucescent beneath on one side of the midrib, nearly green on the other, with 4–7 pairs of veins. G.C.III.15: 301;18:181. Bamb. Jap. t.7,f.1–5,t.13,f.2(c). (*Bambusa S.* Carr., *Pleioblastus S.* Nakai.) China, Japan. Intr. 1862. Zone VI.—Var. **chino** Mak. Smaller; stem 1–1.5 m. tall; lvs. 3.5–15 cm. long, 0.5–1.5 cm. broad, mottled with dull yellow. (*Bambusa Laydeckeri* Marliac, *A. Maximowiczii* Riv.)—Var. **variegàta** Hook. has the lvs. smaller and narrower and irregularly striped with white. B.M.7146(c). (*Bambusa albo-striata* Hort.)—Var. **striàta** Mitf. has the lvs. larger or as large as in the type and striped with white. Icon. Bamb. Jap. t.8,f.9–17(c). (Var. *argenteo-striata* Mak.)

3. A. Híndsii Munro. Stems to 4 m. tall, quite erect, to 2.5 cm. thick, hollow, dark olive-green, bloomy at first, internodes to 20 cm. long; brs. erect, in dense clusters; lvs. mostly erect, 16–20 cm. long, 1–2 cm. broad, long-pointed, tapering at the base, denticulate on one side, dark green above, glaucescent beneath, with 3–6 pairs of veins, tessellated. Bamb. Jap. t.5,f.4–6, t.14,fig.2. R.H.1921:367(h). (*Thamnocalamus H.* E. G. Camus, *Pleioblastus H.* Nakai, *A. erecta* Hort., *B. gracilis* Hort.) China, Japan. Intr. 1875. Zone VII.—Var. **gramínea** Bean. Slenderer; lvs. as long as in the type, but much narrower, scarcely exceeding 1 cm. in width, with 2–4 pairs of veins. Bamb. Jap. t.5,f.1–3,f.14,f.5. (*A. g.* Mak.) Japan. Intr. 1877. Zone VI.—The variety is hardier and handsomer than the type.

4. A. fastuòsa Mak. Stems perfectly erect, to 7, rarely to 15 m. tall, very hollow, to 3.5 or to 8 cm. diam., terete, but the upper internodes flattened, dark green, marked with purplish brown; brs. erect; stem-sheaths to 22 cm. long, purplish and pubescent at first, early deciduous: lvs. 10–18 cm. long, 1.5–2.5 cm. broad, long-pointed, gradually narrowed into a rather long

petiole, lustrous dark green above, glaucous on one side beneath, puberulous, with 5–6 pairs of veins, tessellated. B.S.1:215,t(h). Camus, t.7.f.c,t.9,fc,t. 13,f.a. (*Bambusa f.* Mitf. *Semiarundinaria f.* Mak., *Phyllostachys f.* Nichols., *A. narihira* Mak.) Japan. Intr. 1892. Zone VI.

5. **A. nítida** Mitf. Stems to 6 m., hollow, erect and leafless the first year, branching and arching the second year; stem-sheaths purplish, pubescent: lvs. 5–8 cm. long, 0.6–1.2 cm. broad, slender-pointed, rounded at the base, denticulate on one side, bright green above, glaucescent beneath, with 3–4 pairs of rather faint veins. G.C.III.18:179(h);24:211(h). M.O.t.40. Camus, t.9,f.a.t.12,f.a. S.L.110(h). C. & W. China. Intr. 1889. Zone V.—The hardiest species of the genus; demands partial shade and abundant moisture.

6. **A. anceps** Mitf. Stems slender, to 4 m. tall, green and purplish at first, finally brownish green, narrowly fistulose, 0.8–1.5 cm. thick: branches purplish, slender, clustered; stem-sheaths mottled within; leaf-sheaths ciliate, bristly at the apex: lvs. 3.5–10 cm. long, 0.6–1.2 cm. broad, long-pointed, narrowed into a short petiole, denticulate, bright green above, slightly glaucous beneath, with 2–3 pairs of veins. Camus, t.36,f.c. N. W. Himal. Intr. 1865. Zone VI.—A very graceful bamboo.

3. **PHYLLÓSTACHYS** Sieb. & Zucc. Usually tall shrubs with creeping root-stock, rarely caespitose; stems flattened or grooved on one side or sometimes on 2 sides; nodes prominent, with rather short internodes; brs. usually 2 or 3 at each node; sheaths deciduous: lvs. petioled, small or moderately large, articulated, tessellate: fls. in terminal panicles; spikelets 2–3, 1–4-fld., subtended by imbricated bracts: glumes usually unequal, many-nerved, glabrous; lemma ovate-lanceolate, acuminate; palea 2-keeled, often with 2 mucros; stamens 3, long-exserted: ovary glabrous, style long, with 3 long plumose stigmas. (Greek from *phyllos*, lead, and *stachys*, spike; referring to the leafy inflorescence.) About 25 species in E. Asia and Himal.

A. Lvs. lanceolate to linear-lanceolate: tall plants to 6 m.
  B. Scales at base of the brs. not divided, or incised only to the middle, persistent; stem-sheaths glabrous at the margin, as long or longer than the internode.
    C. Stems spaced.
      D. Stems dark-colored.
        E. Stems dark violet at first changing to yellow-brown.....1. *P. violascens*
        EE. Stems greenish at first becoming dark with age.....2. *P. flexuosa*
      DD. Stems green, branched from the base; brs. spreading.....3. *P. viridi-glaucescens*
    CC. Stems tufted.
      D. Stem-sheaths not spotted or with a few small spots; nodes at base of stems crowded. 4. *P. aurea*
      DD. Stem-sheaths spotted.
        E. Lvs. rounded at base, with rather indistinct veins; stem-sheaths with few large spots.....5. *P. mitis*
        EE. Lvs. cuneate at base, with conspicuous veins; stem-sheaths with numerous and larger spots.....6. *P. reticulata*
  BB. Scales at base of the brs. deeply divided, soon shriveling; stem-sheaths with ciliate margin, shorter than the internodes at maturity.
    C. Stems smooth, lustrous, becoming brown with dark spots or nearly black. 7. *P. nigra*
    CC. Stems rough, dull, becoming grayish yellow or brown.....8. *P. puberula*
AA. Lvs. ovate-oblong, 5–10 cm. long, 1–2.5 cm. broad: stems very zigzag, not exceeding 1 m. 9. *P. kumasasa*

1. **P. violáscens** Riv. Stems to 4 m., dark violet while young, changing to yellowish brown the second year; stem-sheaths violet; brs. usually 3 at each node: lvs. 6–15 cm. long, 1.5–4 cm. broad, narrowed into a purple petiole, serrulate, dark green above, glaucous beneath, with 3–8 pairs of veins. Camus, t.35,f.a. Gs.3:37(h). China. Intr. 1869. Zone VII.—Starts late into growth and is often injured by frost.

2. **P. flexuòsa** Riv. Stems to 6 m. tall, usually lower, bright green at first, becoming darker with age, sometimes nearly black; brs. rather long, flexuose; leaf-sheaths without bristles: lvs. 5–10 cm. long, 0.8–1.4 cm. broad, slender-pointed, abruptly narrowed at base, serrulate on one margin, dark green above, glaucous beneath, with 4–6 pairs of veins. Camus, 31,f.a. (*Bambusa f.* Carr., not Munro.) China. Intr. 1864. Zone VI.

3. **P. viridi-glaucéscens** Riv. Stems to 6 m. or more, yellowish green, purplish at the nodes, very hollow; the outer stems arching; stem-sheaths striped with purple; leaf-sheaths purplish, with tufts of bristles at apex: lvs. 5–10 cm. long, 0.8–2 cm. wide, long-pointed, abruptly narrowed at the base, denticulate on one margin, bright green above, glaucous beneath and pubescent near the base, with 4–7 pairs of rather indistinct veins. G.C. III. 15:433(h). Gn.7:279(h). Camus, t.29,f.a. China. Intr. 1846. Zone VI.

4. **P. aŭrea** Riv. Stems 3–5 m. tall, erect, 2–2.5 cm. thick, yellow or yellowish, with slightly creeping root-stock; nodes crowded at the base, the upper internodes to 15 cm. long, with a swollen band beneath each node: stem-sheaths deciduous; leaf-sheaths with 2 tufts of bristles at apex: lvs. linear, 5–12 cm. long, 1–2 cm. broad, long-pointed, cuneate at the base, denticulate on one side, dark green above, glaucous beneath, glabrous, with 4–5 pairs of veins. B.F.69:233(fl). Gn.8:206. A.F.5:41(h). Bamb. Jap. t.3,f.1–6(c). (*Bambusa a.* Hort.) China, Japan. Intr. before 1870. Zone VI.

5. **P. mìtis** Riv. Stems to 8 m. or more, yellow; stem-sheaths spotted brownish; leaf-sheaths with tufts of bristles at apex; lvs. 6–12 cm., 0.8–2 cm. broad, slender-pointed, rounded or cuneate at base, denticulate on one side, dark green above, glaucous beneath; with 3–6 pairs of rather indistinct veins. Gn. 7:44. Bamb. Jap. t.3,f.7–11. Camus, t.30,f.B. China, Japan. Intr. 1877. Zone VI.

A closely related species or possibly a variety is **P. sulphùrea** Riv. with bright yellow stem. Camus, t.32,f.A.

6. **P. reticulàta** K. Koch. Stems to 6, or sometimes to 15 m., 2–3 cm. thick, bright green, bloomy below the nodes: brs. long; stem-sheaths mottled with purple; leaf-sheaths with tufts of bristles at apex; lvs. 8–15 cm. long, 1.2–3 cm. broad, rather abruptly long-pointed, narrowed into a short petiole, serrulate on one side, bright green above, glaucous beneath and pubescent near base, with 5–7 pairs of veins. Gamble, Ind. Bamb. t.27. Bamb.Jap.t.1,f.5–8. Gs.3:37(h). (*P. bambusoides* Sieb. & Zucc., *P. Quilioi* Riv., *P. Mazelii* Hort.) China. Intr. 1866. Zone VI.—Var. **Castillònis** Mak. Smaller and slenderer; stems yellow, striped with green, and green on the flattened portion: lvs. shorter and narrower, usually striped more or less with pale yellow. Bamb. Jap. t.2,f.1–4. (*P. C.* Mitf.) Japan. Intr. about 1890.—Var. **marliàcea** Mak. Stem wrinkled, particularly near the base; stem-sheaths dark green. (*P. m.* Mitf., *P. Quilioi* var. *m.* Bean.) Bamb. Jap. t.2, f.11–13,t.15,f.4(c). Tenderer.

7. **P. nígra** Munro. Stems to 7 m., green at first changing to black, very hollow, very leafy; nodes conspicuously edged with white below; the brs. usually spotted; lvs. 5–10 cm. long, 0.6–1.5 cm. broad, very thin, denticulate, glabrous, glaucous beneath, with 3–6 pairs of veins. Zone VI. B.M.7994(c). G.C.III.15:369;18:185. Gs.3:36(h). (*P. puberula* v. *n.* Houzeau de Lahaie.) China, Japan. Intr. 1827.—Var. **punctàta** Beadle (*P. puberula* var. *nigro-punctata* Houzeau de Lahaie). A more robust and hardier form with yellow stems dotted with black. Bamb. Jap. t.15,f.1(c).

8. **P. pubérula** Mak. Stems to 5 m. or taller, bright green, very hollow,

very leafy and usually arching, flattened on one, rarely on two sides, bloomy below the nodes; brs. 3–4-angled; stem-sheaths large: lvs. 5–10 cm. long, 0.8–1.2 cm. broad, slender pointed, tapering into a distinct petiole, denticulate, lustrous dark green above, glaucous beneath and pubescent near base; with 4–7 pairs of veins. H.I.2614. B.D.1909:237,t. (*P. Henonis* Mitf., *P. nigra* var. *Henonis* Rendle.) China. Intr. 1890. Zone VI.—Var. **Boryàna** Houzeau de Lahaie. Stems less tall, green at first, changing to dull yellow with purplish brown blotches. Bamb. Jap. t.2,f.5–10,t.15,f.3(c). (*P. B.* Mitf., *P. bambusoides* var. *B.* Mak.)

9. **P. kumásasa** Mitf. Stems 1, sometimes 2 m. tall, upright, very zigzag, much flattened, narrow-fistulose, green; internodes 3–8 cm. long; brs. 2–4 at each node: lvs. distinctly stalked, ovate-oblong to ovate-lanceolate, 6–12 cm. long, 1.5–2.5 cm. broad, long-pointed, broadly cuneate at the base, lustrous dark green above, slightly glaucescent and at first puberulous beneath, with 6–7 pairs of veins. G.C.III.15:369;18:189. Bamb. Jap. t.11,f.1–6(c). (*P. ruscifolia* Nichols., *Shibataea k.* Mak.) Japan. Cult. 1870. Zone VI.—Very distinct on account of its comparatively broad leaves; of low, tufted habit.

6. PALMAE L. PALM FAMILY

Woody plants, usually tree-like with a usually unbranched cylindrical stem: lvs. alternate, usually forming a dense crown at the summit of the stem, rarely scattered, often very large, coriaceous, persistent, palmately or pinnately veined, pinnatifid, palmatifid or entire: infl. a simple or much-branched spadix with or without spatha; fls. usually uni-sexual, often sunk in the spadix; periant 3-merous, in 2 whorls, valvate in the staminate, imbricate or convolute in the pistillate fl., stamens usually 6, rarely 3 or many; carpels 3, rarely 1 or 2, separate or forming a 1–3-celled ovary; each cell 1-ovuled; stigmas usually 3; fr. a berry or drupe with fleshy or fibrous pericarp; seeds albuminous.—About 130 genera with more than 1000 species in tropical and subtropical regions. Only the following palm is sometimes grown within our area, but possibly also *Chamaerops humilis* L. from S. Eu. and *Nannorhops Ritchieana* Wendl. from the Himal. and Afghan. may prove fairly hardy.

TRACHYCÁRPUS Wendl. Trees with unbranched upright stem, rarely nearly acaulescent: lvs. long-stalked, palmate, suborbicular or reniform, palmately more or less deeply incised, with narrow segments: infl. many, between the leaves; spatha sheathing, compressed, tomentose; spadix much-branched: fls. polygamo-monoecious; stamens 6; carpels 3; fr. consisting of 1–3 globose to oblong drupes. (Greek *trachys*, rough, and *karpos*, fruit.)—Four species in China, Jap. and Himal.

T. Fortùnei H. Wendl. Trunk to 15 m., usually lower, robust, dotted with fibrous old leaf-sheaths: lvs. fan-shaped, nearly orbicular, 40–80 cm. long and 0.75–1.20 m. broad, deeply divided to below the middle into linear-lanceolate folded segments about 5 cm. wide and usually more or less flacid; petiole 2-edged, 0.5–1 m. long, with small spiny teeth: fls. in large pendent panicles yellow; fr. bluish black. B.M.5221(c). B.S.1:57,t(h). G.C.III.71: 67(h);73:147(h). (*Chamaerops Fortunei* Hook., *C. excelsa* Mart., not Thunb.) China. Intr. 1830. Zone VIII.—Demands a sheltered position and rich loamy soil.

The closely related and less hardy **T. excélsa** H. Wendl. (*Chamaerops excelsa* Thunb.) from Japan differs chiefly in the smaller and stiffer leaves divided usually not below the middle into stiff segments.

7. LILIACEAE Adans. LILY FAMILY

Herbs, shrubs or trees, sometimes climbing: lvs. alternate, parallel-veined: fls. perfect, rarely unisexual, regular, solitary or in racemes, panicles or umbels; perianth of 6 similar parts in 2 series; stamens 6, rarely less; anthers 2-celled; ovary superior, usually 3-celled, rarely 3 free carpels; ovules 1 to many in each cell; style and stigma 1–3: fr. a usually dehiscent capsule or a berry; seeds with a small embryo and copious albumen.—About 200 genera with 2000 species widely distributed through both hemispheres; mostly herbaceous, only the subfamilies Dracaenoideae, Asparagoideae, Luzuriagoideae and Smilacoideae contain woody species of which a small percentage is hardy within our area.

A. Fr. capsular: plants with a thick cylindric stem, not or sparingly branched, or sometimes acaulescent, and with a dense head of long narrow lvs.: fls. large.....1. *Yucca*
AA. Fr. a berry: slender-branched, upright or climbing shrubs.
B. Upright shrubs.
C. Fls. small, whitish: plants with scale- or bract-like lvs. and leaf-like brts. (cladodes).
D. Fls. in terminal racemes; perfect; stamens 6.....2. *Danae*
DD. Fls. in clusters in the middle of the cladodes, dioecious; stamens 3...3 *Ruscus*
CC. Fls. large, rosy-red, solitary or few: plant with oblong lvs.....4. *Philesia*
BB. Climbing shrubs: fls. in axillary umbels or clusters, sometimes forming terminal panicles: usually prickly, climbing by tendrils.....5. *Smilax*

1. **YUCCA** L. Yucca. Woody plants with thick, simple or branched stem, or acaulescent; the long sword-shaped lvs. crowded into dense terminal clusters; fls. cup- or saucer-shaped, large, usually pendent, white, sometimes tinged with violet, in large usually erect, terminal panicles or racemes; petals distinct or nearly so, thickish; stamens much shorter than the petals, with fleshy filaments and small sagittate anthers; style short, with 3 stigmas: fr. ovoid to oblong, more or less 6-angled, incompletely 6-celled, capsular and usually dehiscent, or fleshy and indehiscent; seeds compressed, subglobose to obovoid, black. (Yuca, the Carib name for the manihot, erroneously applied by Gerarde to this plant.) About 30 species in N. and C. Am.—Besides the species described below there are a number of hybrids in cult. in European gardens, but they are scarcely known in this country. For recent monographs see Trelease in Rep. Mo. Bot. Gard. 13:42–116,(1902), with many illustrations, and Molon, Le Yucche (1914).

A. Lvs. entire, with marginal threads.
B. Lvs. nearly flat: fr. dehiscent, capsular.
C. Lvs. 2–4 cm. wide.
D. Lvs. upright.....1. *Y. filamentosa*
DD. Lvs. flaccid, recurving.....2. *Y. flaccida*
CC. Lvs. 8–12 mm. wide.....3. *Y. glauca*
BB. Lvs. concave, thick and rigid, about 5 cm. wide: fr. fleshy, indehiscent....6. *Y. baccata*
AA. Lvs. denticulate at first, finally slightly filiferous, nearly flat: fr. dry, indehiscent.
B. Lvs. stiff.....4. *Y. gloriosa*
BB. Lvs. flaccid, recurving.....5 *Y. recurvifolia*

1. **Y. filamentòsa** L. Adams Needle. Acaulescent, spreading by short stolons: lvs. erect and spreading, linear-lanceolate, acute, 25–75 cm. long, slightly or scarcely glaucous, with numerous curly threads at the margin: panicle 1–3 m. tall, rather broad, usually glabrous; fls. pendulous, yellowish white, 5–7 cm. across: fr. 5 cm. long; carpels rounded on back. Fl.VII–VIII. B.M.900(c). G.C.III.37:187. R. Mo. 13:t.8–12(h). S. C. to Miss. and Fla. Cult. 1675. Zone V.—Var. **variegàta** Carr. Lvs. striped with yellow or white. L.H.t.50(c).—Var. **concàva** Bak. Lvs. stiff, concave, to 10 cm. broad. R. Mo. 13:t.10.

2. **Y. flàccida** Haw. Similar to the preceding species but lvs. gradually attenuate, recurving, with thinner straighter threads: panicle usually

pubescent, shorter: carpels with angular back. Gn.58:447;78:433. R. Mo. 13:t.12–17(h). N. C. to Ala. Intr. 1816. Zone V.—Var. **màjor** Rehd. Lvs. glaucous, broader: panicle pubescent; petals narrower. B.M.6316(c). (Var. *glaucescens* Trel., *Y. orchioides major* Bak.)—Var. **íntegra** Trel. Lvs. smaller, without fibres on the margin. B.M.2662(c, as *Y. glauca*).—Var. **orchioìdes** Trel. Lvs. stiffer, more erect, without fibres on the margin: infl. racemose. R.H.1861:370.

3. **Y. glaùca** Nutt. Acaulescent or with prostrate short stem: Lvs. narrow-linear, 30–70 cm. long, 6–12 mm. broad, grayish or glaucous green, with a narrow white margin, with few threads: fls. pendulous, greenish white, 6–7 cm. long, in a narrow, rarely branched infl. 1–2 m. tall. Fl. VII–VIII. B.M.2236(c). Gn.76:402. F.E.14:34(h). R. Mo. 13:t.25(h). (*Y. angustifolia* Pursh.) S. D. to N. Mex. Intr. about 1800. Zone V.—Var. **strícta** Trel. With a distinct erect stem and a larger branched infl. B.M.2222(c). Gn.8:130. R. Mo. 13:t.26(h). (*Y. stricta* Sims.)

4. **Y. gloriòsa** L. With a short trunk and cespitose, or sometimes to 5 m. tall and branched: lvs. stiff, straight, 40–60 cm. long, 5–6 cm. broad, spine-tipped, nearly flat, smooth, glaucous green, usually with a few teeth while young and a few threads when old: panicle narrow, 1–1.5 m. tall; fls. pendulous, creamy white, often tinged with red: fr. oblong-ovoid, 5–6 cm. long. Fl. VII–IX. S.S.10:503. G.C.III.28:262. R. Mo. 13;t.43,44(h). (*Y. acuminata* Sweet.) S. C. to Fla. Intr. about 1550. Zone VII.—Var. **robústa** Carr. The outer lvs. usually somewhat recurving. B.M.1260(c).—Var. **nòbilis** Carr. Similar, but lvs. glaucous. Ref.Bot.5;t.317. (*Y. gloriosa* var. *Ellacombei* Bak.)—Var. **plicàta** Carr. with glaucous lvs. plicate toward the end. Gn.49:332. G.C.III. 8:692;15:304.—Var. **supérba** Bak. is similar, but taller and green.

5. **Y. recurvifòlia** Salisb. To 2 m. tall and more or less branched: lvs. 0.5–1 m. long, 3.5–5.5 cm. broad, nearly plane, flexible, recurved, at first glaucous, narrowly yellow- or brown-margined: fls. 5–7 cm. across, creamy white, in narrow panicles to 1 m. tall: fr. 5–6 cm. long, erect. Gt.17:t.580(c). Gn.47:337(h). R.Mo.13:t.46,47(h). B.S.1:58,t(h). (*Y. gloriosa r.* Engelm., *Y. recurva* Haw., *Y. obliqua* Reg., *Y. pendula* Groenl.) Coast of Ga. and Miss. Intr. 1794. Zone VI.—Var. **marginàta** Trel. Lvs. bordered with yellow.—Var. **variegàta** Trel. Lvs. striped with yellow.

6. **Y. baccàta** Torr. Nearly acaulescent or with short prostrate trunk: lvs. rigid, spreading, about 60 cm. long, concave, rough, narrowly brown-bordered, coarsely filiferous: fls. pendulous, 7–8 cm. long in an upright dense panicle about 1 m. tall: fr. conic-ovoid, very large, to 20 cm. long, fleshy. G.C.III.28:103. I.H.20:115. R.H.1887:368. R.Mo.13:t.68(h),69,85. Colo. to N. Mex. and Nev. Intr. about 1887. Zone VIII.

A closely related species is **Y. macrocárpa** Cov. with rigid lvs. to 1 m. long and growing into a small tree to 5 m. tall with a single or little branched trunk. R. Mo. 13,t.70,71.(h). N. Mex., Tex.—A tree of similar habit and appearance is **Y. Treculeàna** Carr. but the lvs. are not or slightly filiferous and denticulate at first. S.S.10: t.498. Gn.12:328. R. H.1887:368. R. Mo. Bot. Gard. 13;t.52–54(h). Tex. to Mex.—Both species are probably about as hardy as *Y. baccata*.

2. **DÁNAË** Medic. Evergreen much-branched shrub with alternate leaf-like cladodes borne in the axils of small scale-like lvs.: fls. in short terminal racemes, perfect; perianth gamopetalons, subglobose, 6-lobed; stamens 6, inserted below the limb of the perianth; filaments connate; style short, with capitate stigma; ovary 3-celled, cells 2-ovuled: fr. a globose red berry, 1-, rarely 2-seeded. (Danae, daughter of King Acrisius of Argos.) One species.

D. racemòsa Moench. Alexandrian Laurel. Upright shrub to 1 m.; cladodes ovate-lanceolate or lanceolate, acuminate, gradually narrowed into a short stalk, many-nerved, 6–10 cm. long, 1–2.3 cm. broad: fls. white, small: fr. red. W.D.t.145(c). S.H.2:860. G.W.2:99(h). (*Ruscus racemosus* L.) Fl. vi–vii. Syria, Transcauc., Persia. Intr. 1739. Zone VIII.

3. **RUSCUS** L. Low evergreen shrubs or subshrubs with green stems and brs. bearing alternate leaf-like cladodes: leaves minute, scale- or bract-like: fls. dioecious, small, borne in clusters in the middle of the upper or rarely lower surface of the cladodes; perianth-segments 6, distinct; stamens 3 with the filaments connate into a tube: ovary 1-celled, 2-ovuled; style short: fr. a 1–2-seeded red berry. (The old Latin name of the plant.) Four species in the Medit. Reg.

A. Cladodes spiny-pointed, stiff.....1. *R. aculeatus*
AA. Cladodes not spiny.
B. Cladodes 7–11 cm. long: fls. in the axil of a leaflike blade.....2. *R hypoglossum*
BB. Cladodes 3.5–7 cm. long: fls. in the axils of a bract.....3. *R. hypophyllum*

1. R. aculeàtus L. Butchers-broom. Rigid evergreen shrub, 0.5–1.2 m. tall, with grooved branched stems: cladodes sessile, ovate, 2–3.5 cm. long, 0.6–2 cm. broad, dark green: fls. 1 or 2 in the axils of a bract in the middle of the upper surface of the cladode, short-stalked, white, 6 mm. across: fr. globose or ovoid, red, 1–1.5 cm. thick. Fl. iii–iv; fr. x–iii. R.I.10:t.437(c). P.B.1:t.20(c). Gn.34:231. R.H.1894:545. S. and W. Eu. north to S. Engl. Cult. before 1750. Zone VII?—Var. **angustifòlius** Boiss., with narrower cladodes.—Var. **latifòlius** Bean. Cladodes up to 5 cm. long and 2–2.5 cm. broad.

A closely related species is **R. hyrcànus** Woronow from Transcauc. and N. Persia, with whorled brs. and 2–5 fls. Intr. about 1911.

2. R. hypoglóssum L. Sub-shrub 25–40 cm. tall; stems unbranched: cladodes narrowly oval to oblanceolate, tapering at the ends, 7–11 cm. long, 2.5–3.5 cm. broad: fls. small, yellowish, borne in the axils of a leaf-like bract 2.5–3.5 cm. long, 6–8 mm. broad, on the upper surface of the cladodes: fr. globose, red, about 1 cm. thick. Fl. iii–iv; fr. x–iii. R.I.10,t.437(c). F.D.4,t.29(c). S. Eur. Intr. before 1600. Zone VII.

3. R. hypophýllum L. Similar to the preceding species, lower, to 30 cm. tall; cladodes oval or ovate, 3.5–7 cm. long, 2–3.5 cm. broad: fls. white, slender-stalked, borne in the axil of a small bract about 0.5 cm. long. B.M. 2049(c). Canary Isls. to Cauc. Intr. about 1625. Zone VIII.—All 3 species valuable for planting in shady places; the ornamental fruits rarely produced in cult.; spreading by suckers.

4. **PHILÈSIA** Juss. Evergreen glabrous shrub, with erect stem and angled brts.: lvs. alternate: fls. terminal, solitary or few; perianth-segments 6, connivent, the inner whorl 2–3 times longer than the outer; stamens 6, with the filaments connate below the middle: ovary 1-celled, with numerous ovules; style elongated, stigma capitate: fr. a berry. (Greek proper name, from *philos*, loved.) One species from Chile to Magellan.

P. buxifòlia Lam. Shrub to 1 m.: lvs. short-stalked, narrow-oblong, stiff, 2.5–3.5 cm. long, dark green above, glaucous beneath, with reflexed margins: fls. short-stalked, nodding, tubular-campanulate, 5 cm. long, rosy-red; sepals oblong, petals oblanceolate. Autumn. B.M.4738(c). G.C.III.55:suppl. June 6. Gn.87:86(h). Intr. 1847. Zone VIII.—Strikingly handsome; demands peaty soil and half-shady sheltered position. It will probably grow

best in the cooler regions of the Pacific Coast. The allied genera Luzuriaga and Lapageria are even tenderer.

5. **SMĬLAX** L. Green-Brier. Deciduous or evergreen, woody or herbaceous climbers, rarely upright; stems often prickly, little branched at base: the lower lvs. reduced to scales, the upper entire or slightly lobed, 3–9-nerved, often blotched with white or gray; stipules usually ending in long tendrils: fls. dioecious, rather small, greenish, yellowish or whitish, in axillary usually peduncled umbels, with the pedicels nearly uniform in length; perianth-segments 6, deciduous; stamens 6, rarely to 15; pistillate fl. with 6 or 3–1 staminodes: ovary 3-celled, cells 1–2-ovuled; stigmas nearly sessile: fr. a small berry, 1–several-seeded. (Ancient Greek name.) About 200 species in the temp. and trop. regions of both hemispheres.

A Umbels in the axils of lvs.
B. Stipules distinct, with tendrils.
C. Stipules narrow.
D. Peduncles much longer than petioles.
E. Berries black.
F. Lvs. green or slightly glaucescent beneath
G. Lvs. ovate to ovate-oblong, quite entire.
H. Pedicels 5–10 mm. long.
I. Tendrils near base of petiole: fr. green-black.
J. Lvs. usually truncate or cuneate....2. *S. hispida*
JJ. Leaves cordate to truncate....3. *S. Sieboldii*
II. Tendrils near apex of petiole: lvs. ovate to ovate-oblong, 5–7 cm. long; fr. blue-black....9. *S. menispermoides*
HH. Pedicels 1.5–2 cm. long: lvs. elliptic to ovate-oblong, rounded or broadly cuneate at base....10. *S. longipes*
GG. Lvs. at least those of vegetative brs. hastate or more or less spiny-toothed: fr. black....7. *S. bona-nox*
FF. Lvs. very glaucous beneath: fr. blue-black, bloomy....8. *S. glauca*
EE. Berries red.
F. Lvs. broadly cuneate at base or rounded, ovate to oblong, sometimes reniform: prickles small, reflexed.
G. Lvs. glaucous beneath, generally oblong....11. *S. megalantha*
GG. Lvs. green beneath, generally ovate to suborbicular....12. *S. china*
FF. Lvs. subcordate or truncate at base, triangular-ovate: prickles stout, straight. 13. *S. excelsa*
DD. Peduncles of the pistillate plant shorter than petioles (sometimes longer in no. 15).
E. Fruit red.
F. Lvs. deciduous: fr. coral-red....6. *S. Walteri*
FF. Lvs. persistent: fr. dark red....14. *S. lanceolata*
EE. Fr. black.
F. Lvs. oblong to oblong-lanceolate.
G. Lvs. coriaceous, 2–3.5 cm. broad: peduncle distinct....15. *S. laurifolia*
GG. Lvs. deciduous, 1–1.5 cm. broad: fls. in nearly sessile clusters. 1. *S. microphylla*
FF. Lvs. broad-ovate to ovate-oblong.
G. Prickles small, bristle-like: lvs. oblong-ovate....4. *S. scobinicaulis*
GG. Prickles stout: lvs. broad-ovate....5. *S. rotundifolia*
CC. Stipule enlarged into a semicircular auricle as long as the very short petiole: lvs. usually cordate....18. *S. discotis*
BB. Stipules not distinct from the petiole, without tendrils: plant unarmed.
C. Petiole glabrous, striate....16. *S. vaginata*
CC. Petiole scabrous, papillose-pubescent....17. *S. trachypoda*
AA. Umbels borne on special leafless brs.: lvs. evergreen, often blotched white...19. *S. aspera*

Sect. 1. Coilanthus A. DC. Perianth-segments of staminate fls. incurved, usually less than 3 mm. long.

1. **S. microphýlla** C. H. Wright. Stems to 4 m. long: brs. angled, with short stout prickles: lvs. short-stalked, oblong to oblong-lanceolate, acute or abruptly acuminulate, 2–6 cm. long, 5–18 mm. broad, glaucous beneath, 3–5-nerved: fls. yellowish, in very short-stalked or nearly sessile umbels; pedicels slender: fr. black, 5 mm. thick, 1-seeded. Fl. VI; fr. X–XI. C. and W. China. Intr. 1908. Zone VII?

Sect. 2. **Eusmilax A. DC.** Perianth-segments spreading or reflexed, longer than 3 mm.

2. **S. híspida** Muhlb. Deciduous: root-stock woody, not much spreading: stems to 15 m. long, densely prickly below; prickles straight, slender, blackish: lvs. ovate or broad-ovate, the larger cordate, pointed, slightly rough-margined, 7–12 cm. long, green beneath, 5–9-nerved: peduncle 2–5 cm. long: fr. black, 8 mm. across, usually many in one umbel. Fl. VI; fr. IX–X. G.F.5:53. B.B.1: 529. (*S. pseudo-china* auth., not L.) Conn. to Ont. and Minn., s. to N. C. and Tex. Cult. 1750. Zone V.—Does not spread by stolons.

3. **S. Siebôldii** Miq. Deciduous, similar to the preceding species: stem armed with slender prickles; brs. angular: lvs. membranous, triangular-ovate, acuminate, cordate, rough-margined, 4–8 cm. long, green on both sides, 5–7-nerved: peduncle about 1.5 cm. long; fr. black, 8 mm. thick, usually few in one umbel. Fl. VI; fr. IX–X. Japan, Korea. Intr. 1905. Zone V.

4. **S. scobinicaûlis** C. H. Wright. Deciduous: climbing to 3 m.: brs. grooved, often densely beset with small dark bristly prickles, sometimes unarmed: petioles 5–10 mm. long, with the tendrils above the middle: lvs. ovate to oblong-ovate, acute or acuminate, rounded or subcordate at base, 6–10 cm. long and 2.5–4.5 cm. broad, green beneath, 7-nerved: peduncles 4–10 mm. long; pedicels 2–5 mm. long: fr. black, 5–8 mm. thick, 1–3-seeded. Fl. VI; fr. X–XI. Intr. 1907. Zone V.

5. **S. rotundifòlia** L. Horse-Brier (Common Green-Brier). Deciduous: root-stock scarcely tuberous, long-creeping; stems and brs. terete, with few stout prickles never present on the nodes; brts. angled: lvs. ovate to suborbicular, acute or cuspidate, rounded or cordate at base, 3–15 cm. long: peduncles 6–12 mm. long; pedicels 2–8 mm. long: fr. bluish-black, 6 mm. diam., 1–3-seeded: Fl. VI; fr. IX–X. B.B.1:528. N.S. to Ga., w. to Minn., Ill. and Tex. Intr. about 1760. Zone IV.—Var. **quadrangulàta** Wood. Brs. and brts. quadrangular.

Probably closely related to this is **S. cantal** Lynch with large triangular-ovate lvs. Cult. in Cambridge, Engl.; origin unknown. Gn.56:506(h).

6. **S. Wâlteri** Pursh. Deciduous: stems slightly angled, prickly below, unarmed above; brts. angled: lvs. ovate to ovate-lanceolate or oblong, acuminate, cordate to broadly cuneate at base, 5–11 cm. long, 2–6 cm. broad, green beneath, 5–7-nerved: peduncles 4–10 mm. long; pedicels 4–6 mm. long: fr. coral-red, 6–8 mm. thick, 2–3-seeded. Fl. VI; fr. IX–X. B.B.1:530. N. J. and Tenn. to Fla. and La. Intr. before 1820. Zone VI.

7. **S. bòna-nox** L. Saw-Brier. Partially evergreen: underground stems spiny: stems green, densely prickly below: lower part of larger stems with a peculiar stiff stellate pubescence: lvs. at least of vegetative brs. hastate or 3-lobed, spiny on the margins and on the midrib below, the upper lvs. triangular-ovate, 4–12 cm. long, green and lustrous on both sides: peduncles 1.5–3 cm. long: fr. black, about 5 mm. thick, 1-seeded. Fl. VI; fr. IX–X. B.B.1:529. N. J. to Fla. west to Kans. and N. Mex. Intr. 1739. Zone VI.

8. **S. glaûca** Walt. Cat-Brier. Partially evergreen: underground stems spiny, tuberous, with long rhizomes: stems and brs. terete, slender, with scattered stout prickles or unarmed; brts. slightly angular: lvs. ovate or broad-ovate, abruptly acuminulate, rounded or subcordate at base, 5–7 cm. long, glaucous beneath (sometimes the whole plant glaucous): peduncle 1–2.5 cm. long; fr. blue-black, bloomy, 6–8 mm. thick. Fl. VI; fr. IX–X. G.F. 5:425. B.M.1846(c). W.D.2:t.111. Mass. to Fla. and Tex. Intr. before 1850. Zone V.

9. **S. menispermoïdes** A. DG. Deciduous: climbing to 3 m., unarmed; brs. nearly terete, brts. slightly angled: petioles 7–10 mm. long, with the tendrils near the apex: lvs. ovate, rounded at base, 3–7 cm. long, 1.5–4 cm. broad, glaucescent beneath, 5–7-nerved; peduncle 2–3, in fr. to 4 cm. long; pedicels slender, 5–8 mm. long: fr. blue-black, 5–8 mm. thick. Fl. VI; fr. x. Himal., W. China. Intr. 1908. Zone VI?

10. **S. lóngipes** Warb. Deciduous: climbing to 5 m.; brs. nearly terete, with scattered short, slightly reflexed prickles: lvs. elliptic to ovate-oblong, abruptly pointed, rounded or broad-cuneate at base, 6–12 cm. long,3. 5–7 cm. broad, with cartilaginous margin, glaucescent beneath, 5–7-nerved; peduncle 2.5–8 cm. long; pedicels 1.5–2 cm. long: fr. blue-black, 6–7 mm. thick, usually 3-seeded. Fl. v; fr. x. C. China. Intr. 1907. Zone VII.

11. **S. megalántha** C. H. Wright. Evergreen: climbing to 6 m.; brs. with stout spines; brts. angled: lvs. ovate to narrow-oblong, acuminate or abruptly pointed, broadly cuneate or obtuse at base, 6–12 cm. long, 3–5 cm. wide, glaucescent beneath, 3–5-nerved; peduncles 1–3 cm. long; pedicels 0.5–2 cm. long: fr. red, 1.2 cm. across, often 1-seeded. G.C.III.68:251. Fl. v; fr. x. China. Intr. 1907. Zone VIII?—Very handsome with its large coral-red frs. and evergreen lustrous lvs.

12. **S. chìna** L. Deciduous: climbing to 5 m.; brs. and brts. more or less angled, with few small spines or unarmed: lvs. usually elliptic, abruptly pointed, broad-cuneate or rounded at base, 5–7 cm. long, 2.5–3.5 broad, sometimes roundish and subcordate and as broad as long, green beneath, 5-nerved; peduncle 1.5–3 cm. long; pedicels about 1 cm. long: fr. red, 8–10 mm. thick; seeds several. Fl. VI; fr. IX–X. C. and E. China. China, Japan, Korea. Intr. before 1759 and again 1907. Zone VI?

13. **S. excélsa** L. Deciduous: tall climber: brs. angled, with stout straight prickles to 7 mm. long: lvs. triangular-ovate to orbicular-ovate, acute or abruptly pointed, truncate or subcordate at base, 4–8 cm. long, 3.5–7.5 cm. wide, green beneath, 5–7-nerved: peduncle about 1.5 cm. long; pedicels 5–7 mm. long: fr. red, about 1 cm. thick; seeds 3–1. Fl. V–VI; fr. X–XI. N.D.1:t.54. S. E. Eu., W. Asia to Persia, Azores. Intr. 1739. Zone VI.

14. **S. lanceolàta** L. Evergreen: climbing to 10 m.; with fleshy tubers; stems stout, glaucous when young, with stout recurved prickles below; brts. slightly angled: lvs. rather thin, ovate-lanceolate to lanceolate, acute or acuminate, cuneate at base, 5–8 cm. long, dull green or glaucescent beneath, 5–7-nerved; peduncle 6–15 mm. long; pedicels 5–14 mm. long: fr. dark red, 5–7 mm. thick, usually 2-seeded. Fl. VI; fr. X. B.B.1:530. Va. to Fla., w. to Ark. and Tex. Intr. ? Zone VIII.—Handsome vine, of vigorous growth with dense bright green foliage.

15. **S. laurifòlia** L. False China-Brier. Evergreen: high climbing; stem armed with stout straight prickles; brs. angled, unarmed: lvs. coriaceous, elliptic to oblong-lanceolate, acute or acuminate, cuneate at base, 6–12 cm. long, dark green above, glaucescent below, 3-nerved; peduncle 4–20 mm. long; pedicels 4–6 mm. long: fr. globose-ovoid, 4–6 mm. long, usually 1-seeded. Fl. VII–VIII; fr. the following year. B.B.1:530. N. J. to Fla., w. to Ark. and Tex. Intr. 1739. Zone VIII.

16. **S. vaginàta** Decne. Deciduous: climbing to 3 m. or shrubby: stem and branches terete, unarmed; petioles 5–15 mm. long, vaginate below the middle and gradually narrowed into the slender upper part, without tendrils: lvs. thin, ovate, acute or short-acuminate, rounded or sub-cordate at base, 3–6.5 cm. long, 1.5–3 cm. wide, pale or glaucescent beneath, 3–5-nerved:

peduncle slender, 1–3 cm. long; pedicels slender, to 1 cm. long: fr. black, 8–10 mm. thick, 1–2-seeded. Fl. VI; fr. X–XII. Himal., W. China. Intr. 1908. Zone VI?

17. **S. trachýpoda** Norton. Deciduous: 1–4 m. tall, upright or climbing; stems terete, unarmed: petioles 1.5–3 cm. long, papillose-pubescent, gradually narrowed from a vaginate base, without tendrils: lvs. ovate, acuminate, cordate at base, 7–10 cm. long, 4–6 cm. wide, entire or slightly erose at the margin, veins 5–7, papillose-pubescent below toward the base: peduncles 3–5 cm. long; pedicels 3–10 mm. long, those of the staminate fls. 10–15 mm. long: fr. blue-black, bloomy, 6–8 mm. thick, 1–2-seeded. Fl. VI; fr. X. C. and W. China. Intr. 1908. Zone VII?

18. **S. discòtis** Warb. Deciduous: climbing to 5 m.; stems nearly terete, like the angled or grooved brs. with scattered or hooked prickles or unarmed; petioles usually 2–4 mm. long; stipules as long or longer, dilated into a broad auricle, rarely petiole about 5 mm. long and exceeding the auricle, without or with short tendrils: lvs. ovate to ovate-lanceolate, acute or acuminate, cordate or rarely rounded at base, 3–9 cm. long, 1.5–4 cm. broad, glaucous and coarsely reticulate beneath, 3–5-nerved; peduncle 1–4 cm. long; pedicels 5–10 mm. long: fr. blue-black, 6–8 mm. thick. Fl. VI; fr. X. C. & W. China. Intr. 1908?—Var. **côncolor** Norton. Lvs. larger, to 9 cm. long and to 5 cm. wide, green beneath; petioles 5–10 mm. long, stipules somewhat shorter, more often with tendrils. C. China. Intr. 1907. Zone VII?

19. **S. áspera** L. Evergreen: climbing: stems and the zigzag brs. angled, with short stout prickles or unarmed: lvs. deltoid-ovate to lanceolate, usually cordate at base, or broad-cuneate, 4–12 cm. long, often prickly on the margin and on the midrib below, often blotched with white, green below, 5–9-nerved: fls. greenish white, sweet-scented, in 5–7-fld. clusters forming axillary and terminal racemes 3–10 cm. long: fr. red, 6 mm. thick, usually 3-seeded. Fl. VIII–IX; fr. I–III. L.B.18:1799(c). Gt.46:t.1443(c). G.C.II.22:784. Gn.62:397. S. Eu. to India. Intr. about 1650. Zone VIII.—Var. **punctàta** Regel. Lvs. blotched with white. Gt.20:t.683(c).—Var. **mauritànica** Gren. & Godr. A robust form with larger lvs. and fewer spines. F.S.10:t.1049. (*S. m.* Desf.) Medit. Reg.

Class II. **DICOTYLEDONEAE** Juss. DICOTYLEDONS

Stems formed of bark, wood and pith; the wood increasing by annual layers below the bark: lvs. net-veined: parts of fls. mostly in 4's or 5's, rarely wanting: embryo with two opposite cotyledons.

Subclass I. **ARCHICHLAMYDEAE** Engl.

Flowers without or with a simple perianth not differentiated into calyx and corolla, or with calyx and corolla but the latter consisting of distinct petals, or petals wanting. (*Apetalae* Juss., *Polypetalae* Lindl., *Dialypetalae* Endl., *Choripetalae* Eichl.)

8. SALICACEAE Lindl. WILLOW FAMILY

Trees or shrubs with bitter bark and soft light wood: leaves alternate, undivided, stipulate: fls. dioecious, appearing before or sometimes with, rarely after the lvs., in catkins, each fl. in the axil of a bract, without perianth; stamens 2 to many; ovary 1-celled; stigma 2–4, often 2-lobed: fruit a dehiscent 2–4-valved capsule with 2–4 placentas bearing numerous seeds surrounded

by tufts of long silky hairs; seeds without albumen; cotyledons flattened.—Two genera with more than 200 species most abundant in the temperate regions of the northern hemisphere.

A. Scales of the catkins laciniate; fls. surrounded by a cup-shaped disk; catkins pendulous: buds with several scales ..... 1. *Populus*
AA. Scales of catkins entire; flowers with one or more glands at the base; catkins usually upright: buds with a single scale ..... 2. *Salix*

1. **PÒPULUS** L. Poplar. Trees with furrowed pale bark and terete or angled brs.: buds resinous: lvs. alternate, mostly ovate to ovate-lanceolate and long-stalked, entire or dentate, involute in bud: fls. in pendulous catkins before the lvs.; each fl. with an oblique cup-shaped disk at the base, in the axil of a laciniate bract; stamens 4 to many; style short; stigmas 2–4: fruit 2–4-valved, ripening before the lvs. are fully grown; seeds small, ovoid or obovoid, brown; cotyledons elliptic. (The classical Latin name of the poplar.)—About 30 species in N. Am., Eu., N. Afr. and in Asia, s. to the Himal.—Ornamental shade and street trees much planted on account of their rapid growth and the easy propagation of most species by cuttings.

A. Lvs. of long shoots white or grayish tomentose below; petioles terete: buds tomentose.
B. Lvs. of shoots lobed ..... 1. *P. alba*
BB. Lvs. not lobed.
C. Lvs. to 15 cm. long ..... 2. *P. tomentosa*
CC. Lvs. to 10 cm. long ..... 3. *P. canescens*
AA. Lvs. glabrous or pubescent below, or thinly tomentose when unfolding; buds glabrous.
B. Lvs. without translucent border.
C. Petioles compressed; lvs. often suborbicular.
D. Lvs. obtuse, acute or short-acuminate.
E. Lvs. cuneate or rounded at the base, coarsely and irregularly dentate: brts. slightly tomentose ..... 4. *P. grandidentata*
EE. Lvs. rounded or subcordate at base, crenate-serrulate to sinuate-dentate.
F. Glands at base of blades on short shoots usually wanting.
G. Lvs. irregularly sinuate-dentate, often obtuse ..... 5. *P. tremula*
GG. Lvs. regularly crenate-serrulate, usually short-acuminate. 6. *P. tremuloides*
FF. Glands at base of blade usually well-developed: buds and young brts. slightly tomentose ..... 7. *P. Sieboldii*
DD. Lvs. long-acuminate, glandular at base of blade ..... 8. *P. adenopoda*
CC. Petioles terete.
D. Lvs. cordate at base, with white tomentum when unfolding, soon glabrous, or always glabrous.
E. Brts. pubescent while young.
F. Lvs. to 15 cm. long, dark green above: ovary glabrous ..... 9. *P. heterophylla*
FF. Lvs. to 30 cm. long, bright green above with red midrib: ovary pubescent. 10. *P. lasiocarpa*
EE. Brts. glabrous: lvs. dull bluish green above: ovary pubescent ..... 11. *P. Wilsonii*
DD. Lvs. rounded or broadly cuneate at the base, rarely subcordate, glabrous or pubescent when unfolding: buds very resinous.
E. Brts. more or less angled (slightly so in Nos. 12 and 13).
F. Lvs. broadest below the middle, usually rounded at base.
G. Brts. brown.
H. Young brts. and lvs. glabrous: ovary glabrous ..... 12. *P. szechuanica*
HH. Young brts. and lvs. finely pubescent or glabrous: ovary pubescent. 13. *P. trichocarpa*
GG. Brts. light yellowish gray, pubescent when young ..... 14. *P. laurifolia*
FF. Lvs. broadest above the middle, cuneate at base, at least on sterile brs.
G. Petioles stout, less than 1 cm. long ..... 15. *P. yunnanensis*
GG. Petioles usually more than 1 cm. long ..... 16. *P. Simonii*
EE. Brts. terete, or only vigorous shoots of young trees sometimes angled.
F. Lvs. greenish beneath, lanceolate to ovate-lanceolate.
G. Petioles 1–4 cm. long; blade lanceolate to ovate-lanceolate. 17. *P. angustifolia*
GG. Petioles 3–7 cm. long; blade ovate- or rhombic- lanceolate. 18. *P. acuminata*
FF. Lvs. whitish beneath, broad-ovate to elliptic-oblong.
G. Brts. yellowish gray: fr. subsessile.
H. Young brts. glabrous or puberulous, not viscid; petiole 1–4 cm. long.
I. Lvs. glabrous, rounded at base, ovate to ovate-lanceolate. 19. *P. suaveolens*
II. Lvs. pubescent on the veins beneath, subcordate, obliquely short-acuminate, elliptic ..... 20. *P. Maximowiczii*
HH. Young brts. viscid-glandular; petiole 5–15 mm. long; lvs. rounded at base, elliptic to ovate-lanceolate ..... 21. *P. koreana*

GG. Brts. brown.
H. Brts. and lvs. pubescent.
I. Lvs. ovate, much longer than broad.....22. *P. tristis*
II. Lvs. broad-ovate, little longer than broad, to 15 cm. long.
23. *P. candicans*
HH. Brts. and lvs. glabrous or the latter minutely pubescent on the veins below, ovate to ovate-lanceolate.....24. *P. tacamahaca*
BB. Lvs. with a clearly defined translucent border.
C. Petioles terete or nearly so; translucent border of blade very narrow. (Hybrids.)
25. *P. berolinensis*
CC. Petioles compressed.
D. Glands at base of blade always absent, blade not or very minutely ciliate.
E. Lvs. broadly triangular-ovate, truncate or broadly cuneate at base, minutely ciliate: stigmas 3–4.....26. *P. Wislizenii*
EE. Lvs. rhombic-ovate, cuneate at base, not ciliate: stigmas 2.....27. *P. nigra*
DD. Glands present (or often absent in No. 28).
E. Lvs. often broad-cuneate, irregularly and sparingly ciliate; glands present or absent. (Hybrids.).....28. *P. canadensis*
EE. Lvs. truncate or subcordate at base, densely ciliate; glands always present.
F. Brts. sharply angled: lvs. ovate or nearly ovate-oblong: bracts of catkins dentate.....29. *P. angulata*
FF. Brts. terete, except very vigorous shoots: bracts of catkins laciniate.
G. Buds glabrous: lvs. triangular-ovate.....30. *P. balsamifera*
GG. Buds pubescent, rarely glabrous: lvs. very broad at base and very coarsely dentate.....31. *P. Sargentii*

Sect. 1. Leuce Duby. White Poplars, Aspen. Bark smooth, rough only at the base of old trunks: buds tomentose or glabrous and glutinous: petioles compressed or nearly terete; lvs. tomentose or glabrous: bracts of catkins fringed; stigmas 2–4, narrow; stamens 5–20, anthers not apiculate: caps. oblong, usually 2-valved.

1. **P. alba** L. White P. Tree to 30 m. or occasionally taller; bark whitish gray, smooth, rough at base of old trunks; young brts. and buds white-tomentose: lvs. on long shoots ovate, palmately 3–5-lobed, with triangular coarsely toothed lobes, acute, subcordate or rounded at base, 6–12 cm. long, dark green above, white-tomentose beneath, on short brts. smaller, ovate to elliptic-oblong, sinuate-dentate, usually gray-tomentose beneath; petioles tomentose: pistillate catkins about 5 cm. long, the staminate longer; scales dentate, fringed with long hairs; stigmas 4; stamens 6–10: R.I.11:t.614(c). H.W.2:135(h),t.34(c). M.D.1914:277(h);1916:231(h). (Abele.) C. and S. Eu. to W. Siberia and C. Asia. Long cult. Zone III.—Large tree of irregular habit, chiefly planted for contrast of the white-felted under side of its lvs.—Var. **nívea** Ait. Lvs. densely silvery-white-tomentose beneath, lobed. (Var. *argentea*, var. *acerifolia* and var. *arembergica* Hort.)—Var. **pyramidàlis** Bge. Columnar tree: lvs. of the short brts. orbicular, coarsely toothed, glabrescent and green beneath. G.C.II.18:556. R.H.1891:188(h). M.D.1916:t.28(h); 1917:t.38(h). (Var. *Bolleana* Lauche, *P. Bolleana* Lauche.) Intr. from Turkest. in 1872.—Var. **globòsa** Spaeth. Shrub or small tree with dense oval head: lvs. slightly lobed, gray-tomentose beneath, pinkish when unfolding. Intr. 1886.—Var. **péndula** Loud. With pendulous brs.

2. **P. tomentòsa** Carr. Chinese White P. Tree similar to *P. alba*; brts. gray-tomentose; buds slightly tomentose; lvs. of long shoots triangular-ovate, acuminate, subcordate or truncate at base, doubly dentate, to 15 cm. long on young trees, dark green above, gray-tomentose beneath, on old trees smaller, sinuately toothed and glabrescent beneath, on short brts. much smaller, ovate or triangular-ovate, sinuately toothed, glabrous beneath. R.H.1903:355. S.L.1:f.7t-u. B.D.1923:t.16(h). (*P. alba* var. *t.* Wesm., *P. alba* var. *denudata* Maxim., *P. pekinensis* L. Henry.) N. China. Intr. 1867. Zone V.

3. **P. canéscens** Sm. Gray P. Tall tree, similar to *P. alba*, but lvs. of long shoots deltoid-ovate, cordate, gray-tomentose beneath, with a few triangular teeth and irregularly glandular-serrate, ciliate, on short brts.

suborbicular to ovate, obtuse, subcordate, not ciliate, with a narrow translucent border, light green beneath, glabrescent: staminate catkins 6–10 cm. long, pistillate 2–3 cm. long; stamens 8–15. R.I.11:t.615,616(c). H.W.2:137. E.H.7:t.382(h). (*P. alba* var. *c.* Sm. *P. alba* Willd., not L., *P. hybrida* Reichenb., *P. Steiniana* Bornm.) Eu., W. Asia. Long cult. Zone IV.—Often considered a hybrid between *P. alba* and *P. tremula*.—Var. **péndula** Dipp. With pendulous brs.

4. **P. grandidentàta** Michx. LARGE-TOOTHED ASPEN. Tree to 20 m., with rather narrow, round-topped head; brts. rather stout, gray-tomentose at first, becoming reddish or orange-brown; buds ovoid, gray-pubescent: lvs. of long shoots ovate, acuminate, truncate to broad-cuneate at base, coarsely sinuate-dentate with callous-mucronate teeth, 7–10 cm. long, dark green above, gray-tomentose beneath at first, soon glabrescent and glaucescent, those of short brts. elliptic, with sharper teeth; petiole glabrescent: catkins 3.5–6 cm. long; scales lobed and fringed with long hairs; disk and ovary pubescent; stigmas 4; stamens 6–12. S.S.9:t.488. N. S. to Ont. and Minn., s. to N. C., Tenn., Ill. and Iowa. Intr. 1772. Zone III.

A related tree, probably a hybrid is **P. pseudo-grandidentata** Dode. Brts. pendulous, tomentose at first: lvs. similar to those of *P. tremula*, but 7–10 cm. across, of thicker texture and with cartilaginous margin: stamens 5; disk glabrous. E.H.7:t.409,f.8. (*P. tremula* var. *p.* Aschers. & Graebn. *P. grandidentata pendula* Hort.) Origin unknown.

5. **P. trémula** L. EUROPEAN ASPEN. Tree to 30 m., usually much smaller, with round open head; suckering; brts. terete, glabrous; buds ovoid, acute, slightly viscid: lvs. thin, suborbicular or ovate, rounded or acute at apex, truncate or subcordate at base, sinuately crenate-dentate, 3–8 cm. long, tomentose when unfolding, quickly glabrous, glaucescent beneath: petioles compressed, glabrous, often as long as blade; lvs. of suckers ovate, to 15 cm. long, pubescent beneath: catkins 8–10 cm. long; scales deeply lobed and fringed; stamens 5–12; stigmas 2, 2-parted: fruiting catkins to 12 cm. long. R.I.11:t.618(c). H.W.2:131(h),t.33(c). Eu., N. Afr., W. Asia and Siberia. Long cult. Zone I.—Var. **péndula** Loud. With pendulous brs. Gn.59:337(h). G.W.7:447(h).—Var. **villòsa** Wesm. Lvs. and brts. silky-pubescent while young. R.I.11:t.617(c). (*P. v.* Lang, *P. canescens* Reichenb., not Sm.)—Var. **Davidiàna** Schneid. Lvs. with smaller and shallower serrations, often rounded and mucronate at apex. Dode, Monog. Pop. t.11,f.31(l). Trans. R. As. Soc. Kor. Br.9:t.1(h). (*P. D.* Dode.) China, N. E. Asia. Intr. 1907. Zone V or I?

Of the closely related **P. rotundifòlia** Griff. from the Himal. only var. **Duclouxiàna** Gombocz is in cult. It differs chiefly in the often cordate and short-acuminate lvs. and in the fruiting catkins being 15–16 cm. long. Dode, Monog. Pop. t.11,f.34a. (*P. D.* Dode.) W. China. Intr. 1908?

6. **P. tremuloìdes** Michx. QUAKING ASPEN. Tree to 30 m.; young brts. glabrous, reddish brown, slender; buds ovoid, pointed, slightly viscid: lvs. thin, ovate to orbicular, short-acuminate, truncate to broad-cuneate at base, finely glandular-serrate, 3–7 cm. long, glabrous and glaucescent beneath; lvs. of suckers ovate, large, glabrous: fr. like those of *P. tremula*, but smaller and catkins slenderer. S.S.9:t.487. For. & Irr.10:424(b). (*P. graeca* Loud., not Ait., ? *P. atheniensis* Ludwig.—American A.) Lab. to Alaska, s. to Pa., Mo., n. Mex. and L. Calif. Intr. about 1812. Zone I.—Var. **péndula** Jaeg. With pendulous brs. (Var. "Parasol de St. Julien").—Var. **aùrea** Daniels is the Rocky Mtn. form: lvs. broader, often broadest near the middle, with a short slender point and more remotely and irregularly serrate, changing to bright or orange-yellow in autumn. For. & Irr.12:151(b). Contrib. U. S. Nat.

Herb.25:t.15(h). (*P. a.* Tidestr., *P. cercidiphylla* Brit.) Intr. 1916.—Var. **vancouveriàna** Sarg. Brts. pubescent or puberulous: lvs. coarsely crenate-serrate, tomentose when unfolding, becoming glabrous. S.M.122. (*P. r.* Trel.) B. C. to Ore. Intr. 1922. Zone V?

7. **P. Siebóldii** Miq. Japanese Aspen. Tree to 20 m.; brts. rather stout, with whitish tomentum partly persisting during summer; buds tomentose: lvs. thickish, ovate, short-acuminate, rounded to cuneate at the glandular base, minutely toothed or glandular-serrulate, 4–8 cm. long, pubescent while young, later glabrescent or finally glabrous; petioles 1–4 cm. long, pubescent: fls. like those of the preceding species, but scales more villous. S.I.1:t.18(c). E.H.7:t.408,f.6. (*P. tremula* var. *villosa* Franch. & Sav., not Wesm., *P. rotundifolia* Simon-Louis, not Griff.) Japan. Cult. 1881. Zone V.

8. **P. adenópoda** Maxim. Chinese Aspen. Tree to 25 m. or more; brts. slender, pubescent when young, becoming grayish brown or brown; buds conical, acute, glabrous: lvs. of long shoots ovate, acuminate, truncate or cordate and with 2 prominent glands at base, crenate-serrate with incurved gland-tipped teeth, 7–10 or occasionally to 15 cm. long, glabrous above or pubescent on the veins, pale green and grayish pubescent beneath at least when young, those of short brts. smaller, ovate to orbicular-ovate, 5–8 cm. long; petioles 1.5–3 or sometimes to 6 cm. long: staminate catkins 6–10 cm. long; scales deeply lobed and long-ciliate: fruiting catkins 12–16 cm. long; caps. short-stalked. Nuov. Giorn. Bot. Ital. n.s.17:247(l). B.D.1922:23,t(h). (*P. tremula* var. *a.* Burk., *P. Silvestrii* Pampan.) C. and W. China. Intr. 1907. Zone V.

Sect. 2. Leucoides Spach. Bark of trunk rough, scaly: lvs. of long and short shoots scarcely different, cordate at base; petiole only at apex slightly compressed; buds conical, scarcely viscid, glabrous: fls. with deeply lobed disk; ovary pubescent; stamens 12–40; anthers oblong, apiculate; style elongated; caps. 2–3-valved.

9. **P. heterophýlla** L. Swamp Cottonwood. Tree to 30 m., in cult. often shrubby; brts. stout, tomentose at first, dull brown or gray at maturity, rarely orange: lvs. broad-ovate, acute or obtuse, cordate or sometimes rounded at base, crenate-serrate, 10–18 cm. long, tomentose when unfolding, becoming glabrous or remaining floccose beneath, dark green above, paler and reticulate beneath, with yellow midrib; petioles 6–8 cm. long: staminate catkins 3–6 cm. long; stamens 12–20; scales filiform-lobed; pistillate few-fld., 3–5 cm. long; scales fimbriate; stigmas 2–3, thick: fr. slender-stalked. S.S.4:t.489. (Downy P., Black Cottonwood.) Conn. to Ga., w. to Ill., Mo. and La. Intr. 1765. Zone V.—Rarely cult.

10. **P. lasiocárpa** Oliv. Round-headed tree, to 20 m.; brts. angled, tomentose when young; buds large, slightly viscid, the basal scales pubescent: lvs. ovate, acuminate, cordate, crenately glandular-serrate and revolute at margin, 15–30 cm. long, glabrous and bright green above, pubescent and light green beneath; petiole about half as long as blade, usually red like the midrib; catkins to 9 cm. long; scales glabrous, slightly laciniate; stamens 30–40; fruiting catkins 15–24 cm. long; caps. short-stalked, pubescent; disk glabrous, lobed. H.I.20:1943. B.M.8625(c). J.L.28:65;34:f.111(h). M.D. 1921:t.10(h). (*P. Fargesii* Franch.) C. and W. China. Intr. 1904. Zone V.—Very striking and handsome on account of its large bright green lvs. with red midrib and petiole.

A related species is apparently **P. violáscens** Dode. Lvs. elliptic-ovate to oblong-ovate, 10–15 cm. long, acute, subcordate, of smaller brts. ovate to lanceolate, glandular-serrate, glabrescent above, white-villous beneath chiefly on the veins; petiole 2–3 cm. long, glabrate, violet. B.D.1921:24(l). China. Cult. 1921. Zone V?

11. **P. Wilsònii** Schneid. Tree to 25 m., with pyramidal head; brts. terete, glabrous, purple when young, older grayish brown; buds slightly viscid, glabrous: lvs. broad-ovate to broadly ovate-oblong, obtuse, cordate to rounded at base, crenate-dentate, 8–18 cm. long, 7–15 cm. broad, glabrous and dull bluish green above, reddish and floccose-tomentose beneath when unfolding, soon nearly glabrous; petiole 6–11 cm. long: pistillate catkins about 7 cm. long, pubescent, in fr. to 15 cm. long; caps. nearly glabrous. B.D.1921:25(h). C. and W. China. Intr. 1907. Zone V.—Ornamental tree, similar to the preceding but lvs. smaller and of duller color.

Sect. 3. Tacamahaca Spach. Balsam Poplars. Bark of trunk furrowed; buds large, very viscid, exhaling a strong balsamic odor: lvs. usually whitish below, without translucent margin, cuneate to subcordate at base; petiole terete or quadrangular, usually grooved above: stamens 18–60; anthers oblong to subglobose; stigmas 2–4, with short style or subsessile, broad; caps. 2–4-valved.

12. **P. szechuánica** Schneid. Tree to 40 m.; young brts. angled, glabrous, often purplish, older yellowish brown, nearly terete; buds purplish, glabrous, viscid; lvs. reddish when young, glabrous, bright green above, whitish beneath, those of long shoots ovate-oblong, acute or short-acuminate, rounded or subcordate at base, or ovate-lanceolate and broad-cuneate at base, crenately glandular-dentate, 11–20 cm. long and 5–11 cm. broad; petioles 2–4 cm. long; those of fruiting brts. broad-ovate on petioles 3–7 cm. long: fruiting catkins to 16 cm. long, glabrous; caps. subsessile, 3–4-valved. G.C.III.61:46. B.D.1921:25(l). W. China. Intr. 1908. Zone V.—Handsome tree on account of its large lvs.

13. **P. trichocárpa** Torr. & Gray. Western Balsam P. Tree to 60 m.; young brts. slightly angled, pubescent or glabrous; buds elongated, glabrous: lvs. broad-ovate to rhombic-oblong, acute or short-acuminate, truncate, rounded or subcordate at base, finely crenate-serrate, 8–12 cm. long, or on vigorous shoots to 25 cm. long, thickish and firm, dark green and glabrous or puberulous above, whitish or rusty beneath and reticulate; staminate catkins 3.5–6 cm. long; stamens 40–60; pistillate catkins slender, 6–8 cm. long; ovary tomentose: caps. 3-valved, pubescent. S.S.9:t.493. G.F.5:281(h). E.H.7:t.388(h). (Black Cottonwood.) Alaska and B. C. to s. Calif. Intr. 1892. Zone IV.—Var. **hastàta** Henry. Lvs. mostly oblong-ovate, acuminate, rounded at base, glabrous or nearly so; ovary less pubescent; caps. often nearly glabrous. Dode, Mon. Pop. t.12,f.105. N. Calif. and northward. Intr. 1892.

P. t. × *angulata* = **P. generòsa** Henry. Lvs. coarsely serrate, pale green beneath, with narrow translucent margin; petiole nearly terete. G.C.III.56:258(h), 259;71:321. Orig. 1912.—Of very vigorous growth.

14. **P. laurifòlia** Ledeb. Tree to 15 m.; brts. slender, sharply angled, pubescent at least near apex, at maturity grayish yellow; buds elongated, upright, but not appressed: lvs. of long shoots ovate-lanceolate to lanceolate, acuminate, rounded at base, finely glandular-serrate, 7–12 cm. long, bright green above, whitish beneath and sparingly pubescent, at least on the midrib; petioles short, pubescent; lvs. of short brts. elliptic to elliptic-ovate, short-acuminate, rounded at base; petioles rather long; catkins about 5 cm. long; scales large, pubescent; stamens 20–30 (or to 60?): caps. 2–3-valved, slightly pubescent. Ledebour, Ic. Fl. Ross. 5:t.479(c). E.H.7:t.410,f.30. B.C.5: 2764(l). B.D.1922:23,t(h). (*P. balsamifera* var. *l.* Wesm., *P. balsamifera* var. *viminalis* Loud.) Siberia. Intr. about 1830. Zone IV.—Var. **Lindleyàna** Aschers. & Graebn. Lvs. narrower, rounded or broad-cuneate at base, with usually wavy margin, those of long shoots generally lanceolate, of short ones

narrow-elliptic. B.C.5:2763. (*P. L.* Carr., *P. salicifolia* Hort., *P. crispa* Hort.) Orig. before 1867.

P. l. × *tristis*? = **P. Wôbstii** Schroed. Similar to *P. laurifolia*, but brts. glabrous, slightly ribbed: lvs. lanceolate, widest about the middle. (*P. balsamifera* var. *W.* Hort.) Orig. unknown.—*P. l.* × *nigra* = *P. berolinensis*; see no. 25.—*P. l.* × *balsamifera* = *P. Petrowskyana*; see under no. 25.

15. **P. yunnanénsis** Dode. Tree; brts. angled, glabrous, brown at maturity; buds glabrous, viscid: lvs. of long shoots elliptic-ovate, acuminate, broadcuneate at base, crenate-serrulate, 6–15 cm. long, bright green above, whitish beneath, glabrous; petiole 5–25 mm. long, often red like the midrib; lvs. of fruiting brs. ovate, subcordate at base, about 15 cm. long: fruiting catkins 10–15 cm. long; caps. nearly sessile, 3–4-valved. Dode, Monog. Pop. t.11,f.103a. B.D.1922:81(h). S. W. China. Intr. before 1905. Zone V.

16. **P. Simònii** Carr. Tree to 12 m. or more, of rather narrow habit; brts. slender, angled, glabrous, reddish brown; buds pointed, upright: lvs. rhombic-ovate or rhombic-elliptic, abruptly acuminate, broad-cuneate or narrowly rounded at base, crenate-serrulate, 6–12 cm. long and 3–8 cm. broad, glabrous, bright green above, whitish or pale green beneath; petiole 1–2 cm. long, reddish; staminate catkins 2–3 cm. long; stamens 8. S.H.1:f.6o-q. C.C.52. B.D.1923:t.16(h). N. China. Intr. 1862. Zone II.—Var. **fastigiàta** Schneid. Narrow-pyramidal tree with upright brs.; brts. slightly angled. U.S.Im.124: t.202(h).—Var. **péndula** Schneid. With pendulous brs.; brts. strongly angled. —Handsome poplar with slender brs. and comparatively small bright green lvs.

17. **P. angustifòlia** James. Narrow-leaved Cottonwood. Pyramidal tree to 20 m., with slender brs.; bark smooth, only on old trunks shallowly fissured; brts. glabrous, terete, orange at maturity; buds small, sharply pointed, glabrous: lvs. lanceolate or ovate-lanceolate, gradually acuminate, rounded or broad-cuneate at base, glandular-serrulate and revolute at margin, 5–10 cm. long or occasionally longer, light green beneath: catkins dense, glabrous; stamens 12–20; stigmas 2 on a short style; caps. 2-valved. S.S.9: t.492. M.D.1912:119(h). (*P. fortissima* Nels. & Macbr., *P. balsamifera* var. *a.* S. Wats.) Assinib. to Nev., Ariz., and N. Mex. Intr. 1893. Zone I.

18. **P. acuminàta** Rydb. Round-topped tree to 15 m., with more or less upright brs.; brts. terete, glabrous, pale yellow-brown; buds acuminate, chestnut-brown: lvs. rhombic-lanceolate, acuminate, broad-cuneate or rarely rounded at base, crenate-serrate, 5–10 cm. long, lustrous and dark green above, light green beneath and glabrous; petioles slender, terete, 2–7 cm. long: catkins slender, glabrous, 2–7 cm. long; ovary broad-ovoid, with nearly sessile stigmas; caps. 3- or 2-valved. S.S.14:t.731. (*P. coloradensis* Dode.) Assinib. to Neb. and Colo. Intr. 1898. Zone I.

P. a. × *Sargentii* = *P. Andrewsii*; see under no. 31.

19. **P. suavéolens** Fisch. Tree to 30 m., with upright brs.; brts. terete, slightly pubescent above the nodes, olive-green while young, later yellowish or pale grayish yellow; buds elongated, viscid: lvs. firm, ovate to ovate-lanceolate, acuminate, rounded or broad-cuneate at base, crenate-serrulate, ciliate, 6–10 cm. long and 3–6 cm. broad, glabrous, usually lustrous above, whitish beneath, palmately 3–5-nerved at base, on young plants sometimes to 18 cm. long and subcordate at base; petiole terete, 1–4 cm. long, glabrous; staminate catkins 4–5 cm. long, pistillate 6–8, in fr. to 13 cm. long; caps. nearly sessile, 3-valved, glabrous. G.C.III.53:198. E.H.7:t.410,f.25. U.S.Im.124:t.

200(h). B.D.1923:t.16,17(h). (*P. balsamifera* var. *s.* Loud.) Turkest., W. China to Korea. Intr. 1834. Zone IV.—Var. **Przewâlskii** Schneid. It differs in its puberulous lvs., loosely villous petioles and pubescent ovaries. (*P. P.* Maxim.) N. W. China, Tibet. Intr. ?

A closely related species is **P. Purdômii** Rehd. Lvs. ovate to narrow-ovate, 10–13 cm. long, or on shoots oblong-ovate and to 25 cm. long, rounded to subcordate at base, pilose on the distinctly raised veins and veinlets beneath or sometimes glabrous, more coarsely glandular-serrate. U.S.Inv.42:t.5(h). N. W. China. Intr. 1914. Zone V.—Handsome large-leaved poplar.

20. **P. Maximowíczii** Henry. Tree to 30 m., with wide-spreading brs.; bark of old trunks gray and deeply fissured; brts. terete, densely pubescent, reddish at first, finally gray: lvs. nearly subcoriaceous, elliptic to elliptic-ovate, rarely suborbicular, abruptly short-acuminate or acute with twisted apex, subcordate, glandular-serrate and ciliate, 6–12 cm. long, dull dark green and wrinkled above, whitish beneath, pubescent on veins and veinlets on both sides; petioles 1–4 cm. long, puberulous; staminate catkins 5–10 cm. long; stamens 30–40; fruiting catkins 18–25 cm. long; caps. subsessile, 3–4-valved, glabrous. S.I.1:t.18(c, as *P. balsamif.* v. *suaveolens*). G.C.III.53:198. Trans. R. As. Soc. Kor. Br.9:t.21(h). N. E. Asia, Japan. Intr. before 1890. —Handsome poplar of vigorous growth.

21. **P. koreâna** Rehd. Tree to 25 m., brts. terete, viscid-glandular at first, later pale brown: lvs. of shoots elliptic or elliptic-ovate to ovate-oblong, short-acuminate, with rarely twisted apex, rounded or sometimes subcordate at base, 7–15 cm. long and to 8.5 cm. broad or occasionally larger, on short brts. elliptic-oblong or elliptic-lanceolate and 4–12 cm. long, cuneate or rounded at base, glandular-crenate-serrulate, dark green and wrinkled above, whitish beneath, glabrous, or those of short brts. sometimes minutely pilose on veins beneath and petioles; petioles 5–10 or on short brts. to 15 mm. long. Korea. Intr. 1918. Zone V.—Handsome poplar, its large bright green lvs. with red midrib.

22. **P. trístis** Fisch. Small tree; brts. pubescent, terete, dark red-brown; buds pubescent, viscid, often subtended by persistent ovate stipules: lvs. narrow-ovate to oblong-ovate, acuminate, rounded or subcordate at base, crenate-serrate, ciliate, about 10 cm. long and 5 cm. wide, whitish and pubescent beneath: fls. and frs. unknown. E.H.7:t.410,f.23. C. Asia. Intr. before 1831. Zone V.

23. **P. cándicans** Ait. Balm of Gilead. Tree to 30 m., with stout spreading brs.; brts. terete or slightly angled, pubescent; buds large, viscid: lvs. broadly ovate-deltoid, acuminate, cordate, rarely truncate at base, coarsely crenate-serrate, ciliate, usually 12–16 cm. long and about 10 cm. broad, dark green and slightly pubescent above, whitish and sparingly pubescent beneath, densely so on the veins; petioles terete, 3–6 cm. long, pubescent; fruiting catkins about 16 cm. long; caps. stalked, 2-valved. S.S.9:t. 491 (excl. stam. fls.). M.A.t.19a(h). (*P. balsamifera* var. *c.* Gray, *P. ontariensis* Desf.—Ontario P.) Origin unknown. Cult. before 1755. Zone IV. —Often planted and escaped from cult. It has been confused with *P. tacamahaca* var. *Michauxii* and supposed to be native to N. Am.

24. **P. tacamahâca** Mill. Balsam P. Tree to 30 m., with ascending brs.; brts. terete, glabrous; buds elongated, pointed, viscid: lvs. rather thick and firm, ovate to ovate-lanceolate, acute or short-acuminate, rounded or rarely broad-cuneate at base, crenate-serrate, minutely ciliate, 7–12 cm. long, glabrous, whitish beneath; petiole terete, slender, 3–5 cm. long: catkins 5–7 cm. long; stamens 12–20; fruiting catkins 12–14 cm. long; caps. ovoid, stalked,

2-valved. S.S.9:t.490. E.H.7:t.387(h). (*P. balsamifera* Duroi, not L.) Lab. to Alaska, s. to N. Y., Mich., Neb., Nev. and Ore. Intr. before 1700. Zone I. —Var. **Michaûxii** Farwell. Lvs. subcordate or rounded at base, finely pubescent on the veins beneath and on petioles and brts. G.C.III.59:230. (*P. balsamifera* var. *M.* Henry, *P. M.* Dode.) N. E. N. Am. Intr. 1917.

P. t. × *balsamifera* = **P. Jáckii** Sarg. Lvs. broad-ovate, long-acuminate, cordate at base, more coarsely serrate and with a narrow translucent border. G.C.III.59:231. B.C.5:2763. (*P. Baileyana* Henry.) Ontario to Vt. and Mich. Intr. 1900.

Sect. 4. Aegeiros Duby. Cottonwoods, Black Poplars. Trees with furrowed bark; buds viscid: lvs. green and stomatiferous on both sides and with a well-defined translucent border, usually triangular-ovate and very broad at base or rhombic-ovate, long-acuminate and more or less coarsely crenate-serrate: stamens 15–30; anthers subglobose: caps. 2–4-valved.

25.× **P. berolinénsis** Dipp. (*P. laurifolia*×*nigra* var. *italica*.) Columnar tree with ascending brs.; brts. slightly angular, pubescent, yellowish gray the 2d year; buds greenish, viscid: lvs. ovate or rhombic-ovate, long-acuminate, rounded or cuneate at base and with or without basal glands, crenate-serrate, with a very narrow translucent non-ciliate border, 7–10 cm. long, about 5 cm. wide, slightly whitish or greenish beneath; petiole terete, with scattered pubescence; catkins glabrous, 4–7 cm. long; stamens about 15. E.H.7:t.410, f.29. (*P. certinensis* Dieck.) Orig. before 1870. Zone I.—A very hardy poplar, perhaps the best for planting on the prairies of the Northwest.

Similar hybrids are: **P. Rasumowskyàna** Schneid. (?*P. laurifolia* × *nigra*). Brts. glabrous, angled: lvs. of long shoots orbicular-ovate, rounded or subcordate at base, to 14 cm. long, those of old trees smaller, elliptic. S.L.1:f.4q-s(l). Orig. before 1882.—**P. Petrowskyàna** Schneid. (?*P. laurifolia* × *balsamifera*). Brts. angled, like the petioles minutely pubescent: lvs. ovate, acuminate, rounded or cordate at base and usually with 1 or 2 glands, strongly crenate-serrate, to 16 cm. long, pale beneath. S.L.1:f.4t-v. Orig. before 1882.—Also *P. Nolestii* Hort. seems to belong here.

26. **P. Wislizènii** Sarg. Tree to 30 m., with stout spreading brs.; bark fissured only on old trunks; brts. terete, glabrous, yellowish; buds puberulous, viscid: lvs. broadly deltoid-ovate, abruptly short-acuminate, truncate and usually abruptly cuneate and without glands at base, coarsely and irregularly crenate-serrate, 5–10 cm. long and as broad or broader, yellowish green, glabrous on both sides; petioles slender, 3–5 cm. long: catkins 5–10 cm. long; disk of pistillate fl. cup-shaped: caps. ovoid, about 10 mm. long, 3–4-valved, on slender pedicels about 1.5 cm. long. S.S.14:t.732. (*P. Fremontii* var. *W.* S. Wats.) W. Tex., N. Mex. Intr. 1894. Zone VI?—Often planted as street and shade tree in its native country like the following 4 related species.

Closely related species, all differing in the short-stalked caps., the pedicel not exceeding 6 mm., are the following: **P. Fremóntii** S. Wats. Tree to 30 m.; brts. stout; winter-buds glabrous: lvs. truncate or subcordate at base, more finely toothed. S.S.9:t.496. M.D.1922:t.11(h). Calif. to Ariz. Intr. 1904. Zone VII or VIII?—**P. arizónica** Sarg. Tree to 25 m.; brts. slender: lvs. deltoid, long-acuminate, truncate or broad-cuneate at base, coarsely serrate, 3.5–5 cm. long: caps. about 6 mm. long. S.M.131. M.D.1922:t.12(h). Calif. to Ariz. and n. Mex. Intr.?—**P. texàna** Sarg. Tree to 20 m.; brts. stout: lvs. long-acuminate, truncate, coarsely serrate, 4–6 cm. long: disk of pistillate fl. minute; pedicel of fr. 2–3 mm. long. S.M.132. N. W. Tex. Intr.?—**P. MacDougálii** Rose. Tree to 35 m.; brts. slender, puberulous at first: lvs. broad-ovate, short-acuminate; truncate to subcordate, usûally rather finely crenate-serrate, 4–8 cm. long, pubescent beneath on the veins at first; petiole slightly compressed: disk minute; pedicel of fr. 3–5 mm. long. S.M.133. S. Calif. to Ariz. Intr.? Zone VIII?

27. **P. nígra** L. Black P. Tree to 30 m., with wide-spreading stout brs. and usually short trunk; bark deeply furrowed, often with large burs; brts. terete, glabrous, orange, changing to ashy gray the 2d year; buds viscid,

reddish, elongated and curving outward at apex: lvs. rhombic-ovate, long-acuminate, broad-cuneate, finely crenate-serrate, non-ciliate, 5–10 cm. long, 4–8 cm. wide, glabrous, light green beneath, on short brts. smaller and broader and often truncate or rounded at base; petioles slender: staminate catkins 4–6 cm. long, scales laciniate; stamens 20–30; fruiting catkins 10–15 cm. long: caps. 2-valved; pedicels slender, 3–5 mm. long. H.W.2:139(h),t.35(c). R.I.11:t.619(c). M.A.t.85(h). Eu., W. Asia. Long cult. Zone I.—Var. **itálica** Dur. LOMBARDY P. Brs. closely ascending, forming a narrow columnar head; lvs. usually more narrowly cuneate: usually staminate. B.C.5:2758(l). H.W.2:140(h). Gn.M.31:293,317.319(h). (Var. *pyramidalis* Spach, *P. i.* Moench, *P. dilatata* Ait.) Orig. before 1750. Intr. to Am. 1784. The few pistillate trees known have less strictly upright brs. and a broader head. E.H. 7:t.383(h).—Striking tree on account of its formal columnar habit; often planted as street tree.—Var. **thevestìna** Bean. Bark of older brs. grayish and of the trunk whitish, otherwise like var. *italica*. Dode, Monog. Pop. t.12,f.80. (*P. t.* Dode.) W. Asia, N. Afr. Cult. 1903.—Var. **plantierénsis** Schneid. Of fastigiate habit, with pubescent brts. and pubescent, usually reddish petioles. Probably cross between var. *italica* and var. *betulifolia*. (Var. *élegans* Bailey.) Orig. before 1885.—Var. **betulifòlia** Torr. Young brts. and petioles pubescent: lvs. pubescent when young: rachis of catkins pubescent or sometimes glabrous. B.M.8298(c, except pist. catkins which belong to *P. Lloydii*). E.H.7:t.409,f.12. (Var. *hudsonica* Schneid., var. *pubescens* Parl., *P. hudsonica* Michx., *P. b.* Pursh.) Eu. Intr. to Am. before 1800. Zone IV.

P. n.×balsamifera = P. canadensis; see no. 28.—*P. n.×angulata = P. robusta*; see under no. 29.

28. ×**P. canadénsis** Moench (*P. balsamifera×nigra*). Tall tree with spreading or more or less ascending brs.; buds viscid; brts. nearly terete or slightly angled, glabrous, rarely pubescent: lvs. deltoid, acuminate, truncate and without or with 1 or 2 glands at base, crenate-serrate, the serration at base of lf. distant, short-ciliate, 7–10 cm. long, glabrous, green beneath; petiole reddish; staminate catkins about 7 cm. long, glabrous; stamens 15–25; (? *P. helvetica* Poederle.) Orig. probably first in France about 1750. The following forms which apparently originated independently in different places have been distinguished: Var. **serótina** Rehd. Tree to 40 m., with wide-spreading and ascending brs.; brts. brownish yellow, grayish the second year: lvs. truncate at base; stamens 20–25. E.H.7:t.386(h),409,f.16. (*P. s.* Hartig.) Known only in the staminate form. The following 2 forms belong here: Var. **erécta** Rehd. Of fastigiate habit. B.H.14:260(h). E.H.7:t.385(h). G.C. III.56:47(h). (*P. monilifera e.* Selys-Longchamp.) Orig. before 1818. Var. **aùrea** Rehd. Form with yellow lvs. I.H.23:t.232(c). Orig. 1871.—Var. **regenerâta** Rehd. Similar to var. *serotina*, but leafing about 2 weeks earlier: catkins about 6 cm. long; stigmas usually 2. (*P. canadensis* Aschers., *P. r.* Henry.) Orig. about 1814; only the pistillate tree known. In France called "Peuplier regenéré" and "Peuplier suisse rouge."—Var. **Eugènei** Schelle. Tree of narrow-pyramidal habit; brts. glabrous, slightly angled; buds small, viscid; lvs. unfolding early, reddish while young, long-acuminate, usually broad-cuneate, about 6 cm. wide, coarsely crenate-serrate, sparsely ciliate; staminate catkins 3.5–5 cm. long; stamens 15–20, with thread-like filaments. E.H.7:t.409,f.17. G.C.III.5668,f.17. B.C.5:2761(h). Am. For.21:995(h). Here belongs probably *P. charkoviensis* Schroed. M.G.17:393(h).—Often planted as a street tree under the name "Carolina Poplar."—Var. **marilándica**

Rehd. Similar to var. *serotina*, but with the brs. more distant and not regularly ascending; brts. terete; leafing earlier: lvs. rhombic-ovate, long-acuminate, cuneate, crenate-serrate, sparsely minutely ciliate while young, about 10 cm. long and 7.5 cm. broad; petioles greenish; pistillate catkins about 6 cm. long; stigmas 2–4. E.H.7:t.409,f.19. Orig. before 1800.—To the same group of hybrids belong *P. Henryàna* Dode, G.C.III.56:46(h),68,f.18, and *P. Lloydii* Henry, G.C.III.56:67(h),68,f.21; the first differing chiefly in its pubescent buds and the second in its minutely pubescent brts. and petioles; this seems to indicate *P. nigra* var. *betulifolia* as one of the parents.—Also *P. Krauseana* Dode, *P. ramulosa* Dode and *P. pseudo-canadensis* Schneid. belong here.

29. **P. angulàta** Ait. Tall tree with stout spreading brs. forming an open head; brts. angled, glabrous, the shoots with projecting ribs; buds greenish, slightly viscid: lvs. ovate or broadly oblong-ovate, rather abruptly short-acuminate, truncate to cordate and with 2 or more glands at base, crenate-serrate and ciliate, to 18 cm. long and to 12 cm. wide, glabrous light green beneath; catkins 5–7 cm. long, glabrous; scales concave, crenate-dentate, not lacerate; stamens 30–40; pistillate fls. sessile; stigmas 3–4. S.L.1:f.1o-p,3q-r. E.H.7:t.384(h),409,f.15. G.C.III.56:68,f.15. Orig. before 1789. Zone V or VI.—Var. **cordàta** Simon-Louis is a staminate tree and said to be hardier than the type.—This species differs from the other poplars of this group in the crenate-dentate scales but otherwise resembles *P. balsamifera var. missouriensis*.

P. a.×*nigra* var. *plantierensis*=**P. robústa** Schneid. Vigorous tree with ascending brs.; brts. angled, minutely pubescent while young: lvs. cuneate to subcordate at base. E.H.7:t.409,f.20. G.C.III.56:66(h). Orig. before 1900.—*P. a.* × *trichocárpa*=*P. generòsa* Henry; see under no. 13.

30. **P. balsamífera** L. Cottonwood. Tree to 30 m., with upright-spreading brs. forming a rather open broad head; brts. slightly angled or nearly terete, only on vigorous shoots often with projecting ribs, glabrous; buds brownish, viscid: lvs. deltoid-ovate or broad-ovate, acuminate, subcordate to truncate and with 2 or 3 glands at base, coarsely crenate-dentate with curved teeth, entire at base and apex, densely ciliate, 7–12 cm. long and about as broad, bright green below, glabrous; catkins 7–10 cm. long; scales divided into filiform lobes; stamens 40–60; stigmas 3–4; fruiting catkins 15–20 cm. long; caps. short-stalked, 3–4-valved. S.S.9:t.495. S.M.137. B.C.5.2759, 2760(h). F.L.7:184,t.(h). (Var. *virginiana* Sarg., *P. virginiana* Fougeroux, *P. monilifera* Ait., *P. deltoidea* var. *monilifera* Henry, *P. canadensis* Michx. f., not Moench, *P. deltoide* Marsh., *P. deltoides* C. F. Hoffm., *P. deltoidea* Bartr.) Que. to N. D., Kans., Tex. and Fla. Intr. before 1750. Zone I.—The tree here considered the typical form and described above is the Northern Cottonwood, var. *virginiana* Sarg., while the two following vars. are southern. —Var. **pilòsa** Sarg. Lvs. like the petioles pubescent when young and often remaining so on the veins beneath until autumn, often slightly larger. (*P. deltoidea* var. *missouriensis* Henry, in part.) Ga. to La., Okla. and Kans.—Var. **missouriénsis** Rehd. Brts. often more strongly angled: lvs. broad-ovate to ovate, 10–16 cm. long and usually longer than broad, more finely crenate-serrate; petioles usually with 3–4 glands at apex, glabrous, rarely pilose on the veins beneath when young. S.S.9:t.494,f.7. S.M.136. (*P. angulata* var. *m.* Henry, *P. deltoidea* var. *m.* Henry, in part, *P. deltoidea* var. *angulata* Sarg., *P. angulata* Michx. f., not Ait., *P. balsamifera* Sarg., 1919.) Vt. to Ohio, Mo., Miss. and Fla. Intr. before 1800?—The cottonwood is much planted

on account of its rapid growth and luxuriant foliage; in Eu. also planted as a timber tree.

A related species is **P. Pàlmeri** Sarg. Tree to 20 m.; brts. slender, glabrous: lvs. ovate, 6–12 cm. long, acuminate, broad-cuneate to rounded at base, rather finely crenate-serrate, ciliate at first: fruiting catkins 12–15 cm. long; pedicels 6–8 mm. long. S.M.138. Texas. Intr. 1918. Zone V?

31. **P. Sargéntii** Dode. Great Plains Cottonwood. Tree similar to *P. balsamifera*, smaller; brts. lighter yellow; buds pubescent: lvs. often broader than long, 7–10 cm. wide, more coarsely serrate with fewer teeth, glabrous, yellow-green; pedicels shorter; fr. obtuse. S.T.2:t.183. S.M.135. Am. For. 26:414(h). (*P. deltoides occidentalis* Rydb.) Sask. and Alb. to Neb., N. Mex. and w. Tex. Intr. 1908. Zone I.

P. S. × *acuminata* = **P. Andrèwsii** Sarg. Differs chiefly in its oblong-ovate, finely crenate-serrate lvs., rounded or cuneate at base, 9–10 cm. long; petiole nearly terete; brts. light orange-brown. B.D.1921:25(l). Colo. Intr. 1913. Zone I or II?

To the sect. Turanga Bge. characterized by polymorphous concolor lvs., pubescent not viscid winter-buds and laciniate deciduous disk, belongs **P. euphrática** Olivier. Tree with slender brs. or shrub: lvs. suborbicular or reniform to narrow-lanceolate or linear, coarsely dentate or entire, reticulate, grayish or bluish green, reticulate; petiole 0.5–4 cm. long: pistillate fls. slender-stalked; stigmas 3, on short styles; caps. oblong-ovate. Brandis, For. Fl.t.63. Wesmael, Monog. Populus,t.10–13. Gn.89:597(h). (*P. diversifolia* Schrenk.) N. Afr., W. to C. Asia. Cult. 1920. Zone VIII?—A closely related species is **P. pruinósa** Schrenk with usually reniform larger lvs. entire or toothed only near apex and glaucous and the disk cut nearly to the base. Wesmael, Monog. Populus,t.14. C. Asia. Cult. ?

2. SÁLIX L. Willow. Deciduous shrubs or trees, rarely evergreen, with usually terete brs.; winter-buds with a single scale: lvs. alternate, rarely subopposite, petioled or sessile, mostly lanceolate, dentate or entire; stipules often developed, chiefly on vigorous brs.: fls. dioecious, in usually upright catkins, before or after the lvs., sessile or on bracted or leafy peduncles or brts.; each fl. in the axil of a bract (or scale), with 1 or 2 glands or rarely a small lobed disk at base; staminate fls. with 1–12, usually 2 stamens, on slender filaments free or sometimes connate, exceeding the bract; pistillate fl. of a single ovary, composed of 2 carpels, sessile or stipitate (pedicelled), with 2, often bifid stigmas sessile or on a usually short style: caps. 2-valved, 1-celled. (The ancient Latin name.) About 300 species chiefly in the colder and temperate regions of the n. hemisphere, few in the s. hemisphere, but none in Australia. Some arborcous species are important timber-trees; the tough flexible brs. of some are used in making baskets; the bark contains tannic acid and salicin. Many species are ornamental.

The difficulty of the classification and determination of the numerous often polymorphic species is increased by frequent hybrids and by the fact that the sexes are separated and that the fls. mostly appear before the lvs. are developed. Within the scope of this book it is impossible to give a complete enumeration of all the species and forms known to have been introduced into the gardens and collections and only the more important and more widely cultivated species and hybrids are found in the following enumeration.

GENERAL KEY TO THE GROUPS AND SPECIES

Stamens 3–9; caps. glabrous; scales yellowish, deciduous: fls. with 2 glands.

A. Lvs. linear-lanceolate or linear, green on both sides; petiole glandless. (Group 1. Nigrae Loud.) ..... 1. *S. nigra*

AA. Lvs. elliptic to lanceolate.

B. Pistillate fls. with 2 glands: petioles glandular.

C. Stigma thick; style short and thick: lvs. elliptic to lanceolate, not reticulate. (Group 2. Pentandrae Dum.)

D. Lvs. acute to acuminate; stipules oblong-ovate ..... 2. *S. pentandra*

DD. Lvs. caudate-acuminate; stipules semicordate ..... 3. *S. lucida*

CC. Stigma narrow, bifid, about as long as the slender style: lvs. broad-ovate to elliptic, reticulate beneath. (Group 3. URBANIANAE Seemen.).....4. *S. cardiophylla*
BB. Pistillate fls. with 1 gland: lvs. lanceolate. (Group 4. TRIANDRAE Dum.)
C. Petioles glandular: lvs. acuminate.....5. *S. amygdalina*
CC. Petioles glandless, slender: lvs. caudate-acuminate.....6. *S. amygdaloides*

Stamens 2, rarely 1.

A. Staminate fls. with 2 glands; scales yellowish or reddish, not dark at apex; catkins on leafy brts., with or after the lvs.
B. Upright trees or shrubs.
C. Filaments villous at base.
D. Catkins 2–7 cm. long: lvs. not reticulate beneath: scales deciduous.
E. Lvs. lanceolate to elliptic: catkins on short leafy brts. with the lvs. shorter than the catkins.
F. Pistillate fls. with 2 glands: lvs. glabrous or soon glabrous. (Group 5. FRAGILES W. D. Koch.)
G. Ovary glabrous.
H. Petiole 6–20 mm. long; pedicel as long or longer than gland. 7. *S. fragilis*
HH. Petiole 2–8 mm. long: ovary sessile.....8. *S. Matsudana*
GG. Ovary thinly pubescent below the middle, short stalked: tree with pendulous brs.....9. *S. elegantissima*
FF. Pistillate fls. with 1 gland: lvs. more or less silky. (Group ALBAE Borrer.)
G. Ovary pubescent; petiole 2–5 mm. long; lvs. silky beneath. 10. *S. jessoensis*
GG. Ovaries glabrous.
H. Lvs. more or less silky; ovary sessile.....11. *S. alba*
HH. Lvs. only slightly silky at first or glabrous: brs. pendulous.
I. Ovary sessile: lvs. linear–lanceolate, 8–15 mm. broad.12. *S. babylonica*
II. Ovary short-stalked; pedicel longer than gland: lvs. lanceolate, 15–22 mm. broad.....13. *S. blanda*
EE. Lvs. linear to linear-lanceolate: catkins on elongated leafy brts.; lvs. about as long as catkins. (Group 7. LONGIFOLIAE Anderss.).....14. *S. longifolia*
DD. Catkins 8–12 cm. long: lvs. reticulate beneath, 6–20 cm. long. (Group 8. PSILOSTIGMATAE Schneid.).....15. *S. phanera*
CC. Filaments glabrous: scales persistent.
D. Lvs. serrulate, pubescent on the veins beneath; catkins 5–13 cm. long. (Group 9. ERIOSTACHYAE Schneid.).....16. *S. moupinensis*
DD. Lvs. entire, glaucous and glabrous beneath; catkins 10–30 cm. long. (Group 10. MAGNIFICAE Schneid.).....17. *S. magnifica*
BB. Low, often prostrate shrubs, not exceeding 1 m; lvs. never linear, not exceeding 8 cm.: catkins on leafy brts.; scales persistent.
C. Ovary glabrous; scales yellowish; pistillate fls. with 1, rarely 2 glands; creeping shrubs; lvs. glabrous. (Group 11. HERBACEAE Borrer.)
D. Lvs. suborbicular, obtuse or emarginate: catkins 4–10-fld.; stigma sessile. 18. *S. herbacea*
DD. Lvs. elliptic or obovate to oblong: catkins many-fld.; ovary with short style.
E. Stamens 2; scales yellow: lvs. green beneath, not reticulate.....19. *S. retusa*
EE. Stamen 1; catkins rose-red at tip: lvs. pale beneath, reticulate...20. *S. uva-ursi*
CC. Ovary pubescent; pistillate fls. with 2 glands.
D. Style wanting; scales yellowish; lvs. reticulate, silky at least when young. (Group 12. RETICULATAE E. Fries.)
E. Petiole 8–20 mm. long: prostrate shrub with glabrous brts.....21. *S. reticulata*
EE. Petiole 4–8 mm. long: upright shrub, rarely to 50 cm. tall; brts. pubescent. 22. *S. vestita*
DD. Style distinct; pistillate fls. with 1 gland; scales dark above the middle: lvs. entire.
E. Filaments glabrous: lvs. glabrous at maturity. (Group 13. OVALIFOLIAE Rydb.) 23. *S. petrophila*
EE. Filaments pilose: lvs. pubescent at least beneath. (Group 14. GLAUCAE E. Fries.)
F. Lvs. 1–3 cm. long: catkins 1–2 cm. long.....24. *S. brachycarpa*
FF. Lvs. 3–8 cm. long: catkins to 4.5 cm. long.....25. *S. glauca*
AA. Staminate fls. with only 1 gland: catkins usually sessile or subsessile, before or with the lvs.; scales persistent, usually dark-colored at apex (pale in Nos. 39–40).
B. Stamens distinct, 2 (partly connate in No. 31).
C. Style wanting or very short, shorter than stigma (about as long in Nos. 26 and 27).
D. Ovary pubescent (glabrous in *S. silesiaca* under No. 28).
E. Pedicel shorter or little longer than scale.
F. Tall shrubs or small trees: lvs. usually rather large and broad; petiole usually 1–2.5 cm. long. (Group 15. CAPREAE Bluff & Fing.)
G. Brts. glabrous, or pubescent only the first year.
H. Lvs. smooth above, glaucous beneath, not reticulate, glabrous or pubescent: brts. soon glabrous.
I. Lvs. acute; stipules small.....26. *S. discolor*
II. Lvs. acuminate; stipules usually conspicuous.....27. *S. Wallichiana*
HH. Lvs. rugose above, reticulate and pubescent beneath: brts. pubescent until autumn.
I. Brts. stout; catkins large: lvs. 6–10 cm. long.....28. *S. caprea*
II. Brts. slender; catkins rather small: lvs. 3–8 cm. long....29. *S. aurita*

GG. Brts. persistently tomentose until the 2d year.
H. Stamens distinct: lvs. 5–9 cm. long, puberulous above....30. *S. cinerea*
HH. Stamens connate below: lvs. to 16 cm. long, glabrate above.
31. *S. Medemii*
FF. Low shrubs, rarely to 3 or 4 m. tall; petiole 2–10 mm. long; lvs. usually small. (Group 16. INCUBACEAE Dum.)
G. Brts. glabrous or glabrate: lvs. glabrous to pubescent beneath.
H. Pedicels 2–3 times as long as gland: lvs. 3–6 cm. long...32. *S. repens*
HH. Pedicel 4–6 times as long as gland: lvs. 5–8 cm. long...33. *S. petiolaris*
GG. Brts. pubescent: lvs. pubescent beneath.
H. Lvs. silky-pubescent and lustrous beneath, serrulate.....34. *S. sericea*
HH. Lvs. grayish tomentose and dull beneath, crenate or subentire.
35. *S. humilis*
EE. Pedicel several times as long as scale: petiole 4–10 mm. long (Group 17. FULVAE Barrett.).....36. *S. Bebbiana*
DD. Ovary glabrous.
E. Ovary stalked.
F. Lvs. cuneate at base, entire: shrubs to 1 m. (Group 18. ROSEAE Anderss.)
37. *S. pedicellaris*
FF. Lvs. rounded or subcordate at base, glandular-serrulate: large shrub or small tree. (Group 19. BALSAMIFERAE Schneid.).....38. *S. pyrifolia*
EE. Ovary sessile or subsessile. (Group 20. LONGIFLORAE Schneid.)
39. *S. hypoleuca*
CC. Style distinct, longer than stigma.
D. Ovary distinctly stalked; style shorter than half the ovary.
E. Ovary pubescent (but usually glabrous in No. 42).
F. Scales light yellow-brown: pistillate catkins in fr. 6–10 cm. long, slender: lvs. entire, glaucous and glabrous or slightly silky beneath (Group 21. HETEROCHROMAE Schneid.).....40. *S. heterochroma*
FF. Scales dark brown at apex.
G. Lvs. lanceolate, tomentose beneath. (Group 22. CANDIDAE Schneid.)
41. *S. candida*
GG. Lvs. glabrous or pubescent, green or pale beneath. (Group 23. PHYLICIFOLIAE Dum.)
H. Lvs. glabrous or pubescent beneath.
I. Ovary usually glabrous: lvs. blackening in drying..42. *S. myrsinifolia*
II. Ovary pubescent: lvs. not blackening.....43. *S. phylicifolia*
HH. Lvs. with white silky tomentum beneath.....44. *S. subcoerulea*
EE. Ovary glabrous. (Group 24. HASTATAE Borrer.)
F. Lvs. silky-pubescent and serrulate, green beneath.....45. *S. adenophylla*
FF. Lvs. glabrous or glabrescent, glaucous beneath.
G. Brts. not bloomy.
H. Lvs. lustrous above, glabrous from the first: caps. 9–11 mm. long.
46. *S. glaucophylloides*
HH. Lvs. dull above, pubescent at first: caps. shorter.
I. Petioles 3–8 mm. long; lvs. acute.....47. *S. hastata*
II. Petioles 5–15 mm. long: lvs. acuminate.....48. *S. cordata*
GG. Brts. bloomy, pedicels very short.....49. *S. irrorata*
DD. Ovary sessile or subsessile (stalked in No. 52); style usually about half as long as ovary.
E. Catkins on leafy peduncles: lvs. elliptic to lanceolate, 1–5 cm. long: ovary pubescent. (Group 25. MYRSINITES Borrer.).....50. *S. myrsinites*
EE. Catkins sessile or subsessile.
F. Ovary glabrous.
G. Lvs. pubescent or tomentose beneath, broad-elliptic to oblong-obovate. (Group 26. CHRYSANTHEAE W. Koch.)
H. Ovary subsessile: lvs. 2.5–7 cm. long.....51. *S. lanata*
HH. Ovary on a stalk 2–3 times as long as gland.....52. *S. Hookeriana*
GG. Lvs. lanceolate, glabrous: brts. usually bloomy. (Group 27. DAPHNOIDES Dum.).....53. *S. daphnoides*
FF. Ovary pubescent (glabrous in No. 54): lvs. usually pubescent or tomentose beneath. (Group 28. VIMINALES Bluff and Fingerh.)
G. Ovary glabrous or sparingly pubescent: lvs. lanceolate, silky or glabrescent beneath.....54. *S. Rehderiana*
GG. Ovary densely pubescent.
H. Lvs. 2.5–6 cm. long, elliptic-oblong to lanceolate.....55. *S. lapponum*
HH. Lvs. 10–25 cm. long, lanceolate to linear lanceolate, tomentose beneath.
56. *S. viminalis*
BB. Stamens 2, more or less connate or only 1: catkins sessile or subsessile (stalked in No. 57).
C. Stamens 2, connate.
D. Style wanting or short, not more than half as long as ovary.
E. Lvs. white-tomentose beneath, linear: catkins stalked; stamens connate ½ or less: ovary glabrous. (Group 29. CANAE Kern.).....57. *S. incana*
EE. Lvs. glabrous or silky beneath; stamens wholly connate: ovary pubescent. (Group 30. PURPUREAE E. Fries.)
F. Fls. in spring before the lvs.
G. Lvs. 5-15 cm. long: filaments wholly connate.

HH. Lvs. lanceolate to narrow-lanceolate, alternate: staminate catkins to 5, pistillate to 8 cm. long in fr. ..... 58. *S. Miyabeana*
HH. Lvs. often subopposite, usually oblong-obovate to oblanceolate: catkins about 2 cm. long ..... 59. *S. purpurea*
GG. Lvs. 1–4 cm. long: broad-oval to oblong: filaments only ½–⅔ connate. 60. *S. caesia*
FF. Fls. in autumn, sessile in the axils of lvs: lvs. oblong to obovate, 6–15 mm. long. 61. *S. Bockii*
DD. Style longer than the pubescent ovary: lvs. elliptic-oblong to oblong, 5–10 cm. long. (Group 31. GRACILISTYLAE Schneid.) ..... 62. *S. gracilistyla*
CC. Stamens 1 or 2 in fls. of the same catkin: ovary stalked, pubescent; style distinct: lvs. oblong-obovate to oblanceolate, 5–12 cm. long. (Group 32. SITCHENSES Bebb.) 63. *S. sitchensis*

KEY BASED ON STAMINATE SPECIMENS[1]

Stamens 3 or more: catkins on leafy or at least bracted stalks.
A. Stamens more than 3.
B. Scales oval to oblong, villous on back, at least toward the base.
C. Catkins slender, about 5 mm. thick; young lvs. usually slightly silky.
D. Lvs. linear-lanceolate, green on both sides ..... 1. *S. nigra*
DD. Lvs. ovate-lanceolate to lanceolate, glaucous beneath ..... 6. *S. amygdaloides*
CC. Catkins about 1 cm. thick: young lvs. glabrous.
D. Stalk of catkins about 2 cm. long, its lvs. more than 1 cm. wide ..... 2. *S. pentandra*
DD. Stalk of catkins about 1 cm. long, its lvs. less than 1 cm. wide ..... 3. *S. lucida*
BB. Scales glabrous, except ciliolate: young lvs. glabrous ..... 4. *S. cardiophylla*
AA. Stamens usually 3 ..... 5. *S. amygdalina*
Stamens 2 or rarely 1.
A. Staminate fls. with 2 glands: filaments distinct.
B. Upright shrubs or trees.
C. Catkins 6–18 cm. long.
D. Bracts and rachis pubescent: catkins 6–12 cm. long: lvs. denticulate or serrulate.
E. Lvs. silky-tomentose beneath ..... 15. *S. phanera*
EE. Lvs. only sparingly pubescent on the veins beneath ..... 16. *S. moupinensis*
DD. Bracts and rachis glabrous; catkins 12–18 cm. long: lvs. entire glabrous, glaucous beneath ..... 17. *S. magnifica*
CC. Catkins 2–7 cm. long.
D. Tall shrubs or trees.
E. Lvs. lanceolate to elliptic-oblong: catkins with the lvs., longer than the sometimes bract-like lvs. of the peduncles.
F. Trees with upright brs. or spreading.
G. Young lvs. and brts. more or less silky.
H. Scales broad-ovate ..... 10. *S. jessoensis*
HH. Scales oblong-ovate to lanceolate ..... 11. *S. alba*
GG. Young lvs. and brts. glabrous or slightly silky.
H. Catkins 3–4 cm. long; bracts oblong: brts. brown or olive. 7. *S. fragilis*
HH. Catkins 1–1.5 cm. long; bracts oval; brts. yellowish ..... 8. *S. Matsudana*
FF. Trees with pendulous brts.
G. Catkins 2–4 cm. long.
H. Brts. brown or olive.
I. Peduncles and young lvs. slightly silky ..... 12. *S. babylonica*
II. Peduncles at base and young lvs. glabrous ..... 13. *S. blanda*
HH. Brts. yellow ..... 11. *S. alba tristis*
GG. Catkins 1–1.5 cm. long: brts. yellowish ..... 8. *S. Matsudana pendula*
EE. Lvs. linear: catkins on elongated leafy brts ..... 14. *S. longifolia*
DD. Low shrubs not exceeding 1 m.: catkins after the lvs. on leafy brts.
E. Lvs. linear or linear-lanceolate; stamens villous to the middle ..... 14. *S. longifolia*
EE. Lvs. broader: stamens pilose only at base.
F. Brts. densely villous: catkins 1–2 cm. long ..... 24. *S. brachycarpa*
FF. Brts. glabrous or glabrescent.
G. Lvs. obtuse and rugose above: catkins slender; scales pale ..... 22. *S. vestita*
GG. Lvs. acute, not rugose: scales dark at apex ..... 25. *S. glauca*
BB. Prostrate or creeping shrubs.
C. Lvs. 1.5–5 cm. long, rugose above, strongly reticulate beneath; petiole 8–20 mm. long ..... 21. *S. reticulata*
CC. Lvs. smaller, not rugose above; petiole short.
D. Lvs. obovate to oblanceolate: catkins many-fld.
E. Fls. with 2 stamens.
F. Catkins about 1.5 cm. long; scales yellowish, slightly darker at apex. 19. *S. retusa*
FF. Catkins 2–3 cm. long; scales dark ..... 23. *S. petrophila*
EE. Fls. with 1 stamen ..... 20. *S. uva-ursi*
DD. Lvs. suborbicular: catkins 4–10-fld. ..... 18. *S. herbacea*

[1]On account of the great variability of the species, the numerous hybrids and the often slight differences if not all the characters can be taken into consideration this and also the following keys allow in many cases only an approximate determination and cannot be considered final without further study of descriptions and specimens.

AA. Staminate fls. with only one gland.
B. Filaments distinct; stamens 2.
C. Catkins with or after the lvs. on leafy or bracted brts.
D. Brts. pubescent or villous.
E. Catkins 1–2 cm. long; brts. finely pubescent.....42. *S. myrsinifolia*
EE. Catkins larger: brts. villous.
F. Catkins densely clothed with yellow villous hairs, 3–4 cm. long and 1.5 cm. thick.....51. *S. lanata*
FF. Catkins white-wolly.
G. Lvs. entire: catkins 4–5 cm. long, 1.5 cm. thick.....52. *S. Hookeriana*
GG. Lvs. glandular-serrate: catkins 3–4 cm. long and 1 cm. thick. 45. *S. adenophylla*
DD. Brts. glabrous or nearly so.
E. Scales yellowish or light yellow-brown.
F. Scales nearly glabrous.
G. Catkins 1–1.5 cm. long.....37. *S. pedicellaris*
GG. Catkins 3–6 cm. long.....39. *S. hypoleuca*
FF. Scales pubescent: catkins 4–5 cm. long, densely silky.....40. *S. heterochroma*
EE. Scales dark at apex or sometimes only pinkish.
F. Anthers red: catkins 1.5–2 cm. long, slender; scales dark brown. 50. *S. myrsinites*
FF. Anthers yellow or only slightly reddish at first.
G. Lvs. rather densely glandular-denticulate.
H. Catkins up to 5 cm. long; scales dark; basal lvs. short-petioled, cuneate. 46. *S. glaucophylloides*
HH. Catkins up to 3 cm. long; scales rather light; basal lvs. slender-petioled, rounded at base.....38. *S. pyrifolia*
GG. Lvs. remotely denticulate or nearly entire.
H. Lvs. glabrous or silky only on midrib beneath: catkins 2–3 cm. long.
I. Lvs. usually rounded at base.....47. *S. hastata*
II. Lvs. cuneate at base.....43. *S. phylicifolia*
HH. Lvs. more or less pubescent when young, blackening in drying: catkins 1–2 cm. long.....42. *S. myrsinifolia*
CC. Catkins before or with the lvs., sessile or subsessile; without or with only 1–3 small bracts at base.
D. Brts. bloomy.
E. Catkins 3–4 cm. long, with long silky hairs little shorter than stamens. 53. *S. daphnoides*
EE. Catkins 2–2.5 cm. long; stamens distinctly longer than hairs.
F. Young lvs. glabrous.....49. *S. irrorata*
FF. Young lvs. silky beneath.....44. *S. subcoerulea*
DD. Brts. not bloomy.
E. Brts. pubescent at least toward the apex.
F. Hairs of bracts yellowish, about as long as stamens; anthers red; catkins thick.....55. *S. lapponum*
FF. Hairs shorter, whitish.
G. Anthers red.
H. Brts. short-pubescent; catkins 1–1.5 cm. long.....35. *S. humilis*
HH. Brts. woolly-floccose; catkins about 2.5 cm. long.....41. *S. candida*
GG. Anthers yellow.
H. Brts. persistently pubescent, rather stout: catkins 2 cm. or more long and more than 1 cm. thick.....30. *S. cinerea*
HH. Brts. finely pubescent, becoming glabrous: catkins 2 cm. or less long and scarcely 1 cm. across.
I. Brts. yellowish or gray-brown; catkins nearly 1 cm. across. 56. *S. viminalis*
II. Brts. red-brown: catkins about 7 mm. thick: brts. slender.
J. Catkins 1.5–2 cm. long: upright shrub.....34. *S. sericea*
JJ. Catkins 1–1.5 cm. long: prostrate or ascending shrub. 32. *S. repens*
EE. Brts. glabrous.
F. Anthers red.
G. Scales with yellowish hairs as long as stamens; catkins 12–15 mm. thick. 55. *S. lapponum*
GG. Scales with whitish shorter hairs: catkins about 8 mm. thick. 54. *S. Rehderiana*
FF. Anthers yellow.
G. Catkins 2–5 cm. long: brts. rather stout.
H. Scales dark brown or nearly black above the middle.
I. Catkins ovoid-oblong, 1.5 cm. thick.....28. *S. caprea*
II. Catkins cylindric-oblong, usually less than 1.5 cm. thick.
J. Catkins sessile, about 3 cm. long.
K. Winter-buds finely pubescent.....53. *S. daphnoides*
KK. Winter-buds glabrous.....26. *S. discolor*
JJ. Catkins short-stalked, with a few bracts at base.
K. Catkins 3.5–5 cm. long.....46. *S. glaucophylloides*
KK. Catkins 2.5–3 cm. long.....48. *S. cordata*

HH. Scales paler, light red-brown to pinkish toward the apex.
I. Filaments about 6 mm. long, glabrous.....27. *S. Wallichiana*
II. Filaments about 1 cm. long, villous at base.....36. *S. Bebbiana*
GG. Catkins 8–15 mm. long: brts. slender; scales red-brown.....29. *S. aurita*
BB. Filaments connate or fls. with only 1 stamen.
C. Stamens 2; filaments partly or wholly connate.
D. Fls. before or with the lvs.
E. Brts. tomentose: filaments connate ½.....31. *S. Medemii*
EE. Brts. glabrous (pubescent the first year in Nos. 57 and 62.)
F. Anthers reddish when young.
G. Catkins 1.5–2.5 cm. long; shrub with long slender brs.....59. *S. purpurea*
GG. Catkins 1 cm. or less long: low shrub, less than 1 m. tall.....60. *S. caesia*
FF. Anthers yellow.
G. Scales obtuse.
H. Filaments connate ½ or less; catkins usually short-stalked, with the lvs.....57. *S. incana*
HH. Filaments wholly connate; catkins sessile.....58. *S. Miyabeana*
GG. Scales ovate-lanceolate, acuminate.....62. *S. gracilistyla*
DD. Fls. in late summer or autumn in the axils of lvs.....61. *S. Bockii*
CC. Stamen 1 and 2 in fls. of the same catkin: brts. tomentose or glabrescent: catkins on short bracted stalks.....63. *S. sitchensis*

KEY BASED ON PISTILLATE SPECIMENS

Ovary glabrous.
A. Bracts yellowish to yellow-brown, not dark at apex (reddish in No. 20); catkins usually on leafy stalks: brts. glabrous.
B. Upright shrubs or trees.
C. Ovary stalked.
D. Fls. with 2 glands.
E. Style distinct: petioles glandular: lvs. glandular-serrulate, glabrous.
F. Stigmas short, thick.
G. Pedicels about twice as long as gland.....2. *S. pentandra*
GG. Pedicel 3–4 times as long as gland.....3. *S. lucida*
FF. Stigmas narrow, bifid.....4. *S. cardiophylla*
EE. Style wanting.
F. Catkins slender, 2–5 cm. long.
G. Tree with upright brs.....7. *S. fragilis*
GG. Tree with pendulous brs.: ovary slightly pubescent at base. 9. *S. elegantissima*
FF. Catkins short and dense, 1–2 cm. long; pedicels short.....8. *S. Matsudana*
DD. Fls. with 1 gland.
E. Scales villous: lvs. serrulate or denticulate: caps. green.
F. Catkins on rather short brts., longer than the basal lvs.: lvs. serrulate.
G. Lvs. linear or linear-lanceolate.
H. Lvs. green on both sides, glabrous.....1. *S. nigra*
HH. Lvs. whitish-tomentose beneath.....57. *S. incana*
GG. Lvs. elliptic-oblong to lanceolate, more or less glaucous beneath and glabrous.
H. Trees with upright or spreading brs.
I. Pedicels 4 or 5 times as long as gland; petiole slender. 6. *S. amygdaloides*
II. Pedicel 2 or 3 times as long as gland: petiole short.. 5. *S. amygdalina*
HH. Tree with pendulous brts: pedicel short..... 13. *S. blanda*
FF. Catkins on elongated brts.: lvs. about as long as catkins, narrow, remotely denticulate.....14. *S. longifolia*
EE. Scales nearly glabrous: lvs. entire, oblong to obovate, obtuse: caps. reddish green. 37. *S. pedicellaris*
CC. Ovary sessile or subsessile (see also No. 8); fls. with 1 gland.
D. Catkin 2–7 cm. long.
E. Scales villous at least on margin.
F. Lvs. more or less silky: brs. upright or pendulous.....11. *S. alba*
FF. Lvs. glabrous or slightly silky when unfolding narrow-lanceolate: brs. pendulous.....12. *S. babylonica*
EE. Scales glabrous: stigma sessile: lvs. elliptic to oblong.....39. *S. hypoleuca*
DD. Catkins 8–30 cm. long, glabrous or sparingly pubescent.
E. Lvs. serrulate; catkins sparingly pubescent.....16. *S. mouvinensis*
EE. Lvs. entire; catkins quite glabrous.....17. *S. magnifica*
BB. Low prostrate shrubs: lvs. small.
C. Lvs. suborbicular, serrulate: catkins few-fld.; style distinct.....18. *S. herbacea*
CC. Lvs. elliptic to oblanceolate, remotely and slightly toothed.
D. Scales yellowish: lvs. green beneath.....19. *S. retusa*
DD. Scales rose-red at tip: lvs. glaucescent beneath.....20. *S. uva-ursi*
AA. Scales dark at apex; upright shrubs or trees.
B. Catkins on leafy or bracted stalks, with or after the lvs.
C. Brts. pubescent or villous.
D. Catkins densely clothed with yellow villous hairs; ovary sessile; style rather long. 51. *S. lanata*

DD. Catkins white-villous: ovary stalked.
E. Lvs. entire: catkins about 1.5 cm. thick....52. *S. Hookeriana*
EE. Lvs. glandular-serrulate; catkins about 1 cm. thick....45. *S. adenophylla*
CC. Brts. glabrous or glabrate.
D. Pedicels as long or longer than scale: catkin in fr. 4–7 cm. long.
E. Veins of lvs. prominent beneath....38. *S. pyrifolia*
EE. Veins of lvs. not raised beneath....46. *S. glaucophylloides*
DD. Pedicel shorter than scale.
E. Style much longer than stigma; catkins very villous....47. *S. hastata*
EE. Style slightly longer than stigma: catkins moderately pubescent.
42. *S. myrsinifolia*
BB. Catkins sessile or subsessile, before or with the lvs.
C. Brts. bloomy.
D. Ovary short-pedicelled....53. *S. daphnoides*
DD. Ovary sessile....49. *S. irrorata*
CC. Brts. not bloomy.
D. Ovary pedicelled....48. *S. cordata*
DD. Ovary subsessile....54. *S. Rehderiana*

Ovary pubescent.

A. Scales yellowish to yellow-brown, not dark at apex: catkins on leafy or bracted stalks.
B. Catkins 1–5 cm. long; stigma sessile or subsessile.
C. Brts. glabrous; catkins 3–5 cm. long.
D. Catkins on rather short leafy stalks, its lvs. shorter than the catkins.
10. *S. jessoensis*
DD. Catkins on elongated leafy brts., its lvs. about as long as catkins.
14. *S. longifolia*
CC. Brts. pubescent: catkins 1–2 cm. long: low shrub....24. *S. brachycarpa*
BB. Catkins 6–30 cm. long; style distinct.
C. Pedicel not exceeding the gland or wanting.
D. Lvs. glabrescent....16. *S. moupinensis*
DD. Lvs. silky-villous beneath....15. *S. phanera*
CC. Pedicel several times longer than gland....40. *S. heterochroma*
AA. Bracts dark at apex.
B. Catkins on leafy stalks or brts.
C. Prostrate shrubs.
D. Lvs. broad-elliptic to obovate; petiole 8–20 mm. long: fls. with 2 glands.
21. *S. reticulata*
DD. Lvs. elliptic to oblanceolate; petiole 3–6 mm. long: fls. with 1 gland.
23. *S. petrophila*
CC. Upright shrubs.
D. Style distinct; ovary stalked.
E. Lvs. usually serrate, glabrous or nearly so....50. *S. myrsinites*
EE. Lvs. entire.
F. Lvs. pubescent beneath; ovary short-stalked; hairs of bracts as long as styles.
25. *S. glauca*
FF. Lvs. glabrous; pedicels 3–4 times as long as gland; hairs shorter than styles.
43. *S. phylicifolia*
DD. Style wanting; ovary sessile: lvs. pubescent....22. *S. vestita*
BB. Catkins sessile or subsessile, without or with 1–3 small bracts at base.
C. Style wanting or shorter than stigma.
D. Brts. pubescent: pedicels distinct; stigma sessile or subsessile.
E. Caps. attenuate at apex: winter-buds pubescent.
F. Catkins up to 9 cm. long: tall shrubs.
G. Pubescence of brts. dark gray....30. *S. cinerea*
GG. Pubescence of brts. light gray or whitish....31. *S. Medemii*
FF. Catkins 1.5–3, rarely to 4 cm. long; stigma sessile or on a short style: low shrub....35. *S. humilis*
EE. Caps. obtuse, about 4 mm. long; stigma sessile: winter-buds glabrate or minutely pubescent....34. *S. sericea*
DD. Brts. glabrous.
E. Ovary stalked.
F. Style distinct, but short.
G. Pedicels, at least the lower ones, longer than scale: catkins not bracted at base....26. *S. discolor*
GG. Pedicels shorter than scale: catkins usually with small bracts at base.
27. *S. Wallichiana*
FF. Style wanting.
G. Pedicel about as long as scale.
H. Catkins 5–6 cm. long....28. *S. caprea*
HH. Catkins up to 3 cm. long....29. *S. aurita*
GG. Pedicel several times longer than scale....36. *S. Bebbiana*
EE. Ovary sessile or subsessile.
F. Fls. in early spring before the lvs.
G. Style distinct....54. *Rehderiana*
GG. Style wanting.
H. Catkins about 1 cm. long: low shrub, not exceeding 1 m....60. *S. caesia*
HH. Catkins 2–4 cm. long: taller shrubs or trees.

II. Catkins alternate; scales longer than half the ovary, brown: tree. 58. *S. Miyabeana*

FF. Fls. in late summer; catkins in the axils of lvs. 61. *S. Bockii*

CC. Style as long as stigma or longer.

D. Ovary sessile or subsessile.

E. Style shorter than ovary; scales oblong, obtusish. 56. *S. viminalis*

EE. Style longer than ovary. 60. *S. gracilistyla*

DD. Ovary stalked, on a stalk as long or longer than gland.

E. Brts. pubescent.

F. Tomentum of brts. floccose; scales long-villous; style red, longer than stigma. 41. *S. candida*

FF. Tomentum of brts. villous; scales short-pubescent; style about as long as stigma. 63. *S. sitchensis*

EE. Brts. glabrous.

F. Brts. bloomy: catkins subsessile. 44. *S. subcoerulea*

FF. Brts. not bloomy: catkins on short bracted stalks.

G. Pedicel about twice as long as gland. 42. *S. myrsinifolia*

GG. Pedicel 3–4 times as long as gland. 43. *S. phylicifolia*

KEY BASED ON VEGETATIVE CHARACTERS

Upright shrubs or trees.

A. Lvs. glabrous or only slightly pubescent beneath at maturity.

B. Lvs. green on both sides.

C. Lvs. oblong-lanceolate to lanceolate.

D. Petiole glandular: lvs. 4–12 cm. long, glandular-serrulate.

E. Lvs. acuminate. 2. *S. pentandra*

EE. Lvs. caudate. 3. *S. lucida*

DD. Petiole glandless.

E. Lvs. 6–12 cm. long, glandular-serrulate. 16. *S. moupinensis*

EE. Lvs. 1–5 cm. long, serrulate or sometimes entire (see also *S. myrtillifolia* under No. 38). 50. *S. myrsinites*

CC. Lvs. linear-lanceolate to linear; petiole glandless.

D. Lvs. closely serrulate. 1. *S. nigra*

DD. Lvs. remotely denticulate. 14. *S. longifolia*

BB. Lvs. glaucous or glaucescent beneath.

C. Lvs. lanceolate to linear-lanceolate, at least 4 times longer than broad.

D. Lvs. distinctly serrate or denticulate.

E. Lvs. quite glabrous at maturity.

F. Brts. bloomy.

G. Lvs. obscurely serrulate or subentire; petiole about as long as bud or shorter, scarcely exceeding 1 cm. 49. *S. irrorata*

GG. Lvs. usually serrulate; petiole always longer than bud, up to 2 cm. long. 53. *S. daphnoides*

FF. Brts. not bloomy.

G. Brs. upright.

H. Petiole glandular.

I. Brts. brittle at base; petiole 8–15 mm. long. 7. *S. fragilis*

II. Brts. not brittle at base; petiole 3–10 mm. long. 5. *S. amygdalina*

HH. Petiole glandless or sometimes obscurely glandular in No. 11.

I. Lvs. caudate-acuminate; petiole slender, 1–1.5 cm. long. 6. *S. amygdaloides*

II. Lvs. acuminate or acute; petiole not longer than 1 cm.

J. Lvs. long-acuminate, closely serrulate, broadest below the middle.

K. Lvs. slightly silky at first, soon glabrous. 8. *S. Matsudana*

KK. Lvs. more or less silky beneath. 11. *S. alba*

JJ. Lvs. acute or acuminate, often broadest above the middle.

K. Stipules lanceolate, as long or longer than petiole; lvs. alternate, sinuate-serrulate. 58. *S. Miyabeana*

KK. Stipules usually wanting or minute; lvs. often opposite and often sub-entire. 59. *S. purpurea*

GG. Brs. pendulous.

H. Brts. yellow: lvs. usually slightly silky beneath. 11. *S. alba tristis*

HH. Brts. olive- to red-brown, sometimes yellowish: lvs. glabrous.

I. Lvs. narrow-lanceolate, 8–15 mm. wide, finely serrulate.

J. Petiole to 8 mm. long; brts. brown. 12. *S. babylonica*

JJ. Petiole not exceeding 5 mm.: brts. olive or yellowish. 8. *S. Matsudana pendula*

II. Lvs. broader, usually 15–22 mm. wide.

J. Lateral veins diverging at an angle of more than 45°. 9. *S. elegantissima*

JJ. Lateral veins diverging at an angle of 45° or less. 13. *S. blanda*

EE. Lvs. pubescent beneath, at least along the midrib.

F. Pubescence of white silky hairs.

G. Petiole glandular: tree. 11. *S. alba*

GG. Petiole glandless: shrub.....33. *S. petiolaris*
FF. Pubescence of brown hairs: brts. usually purple.....34. *S. sericea*
DD. Lvs. entire, 1.5–4 cm., silky beneath.....32. *S. repens*
CC. Lvs. ovate or elliptic to ovate- or elliptic-lanceolate, less than 4 times as long as broad.
D. Lvs. entire or indistinctly toothed (see also no. 36).
E. Lvs. 1–10 cm. long.
F. Lvs. glabrous.
G. Lvs. oblong, glaucous and finely reticulate beneath.....37. *S. pedicellaris*
GG. Lvs. elliptic to elliptic-oblong, not reticulate.
H. Petiole 2–6 mm. long: lvs. glaucous beneath, 2–5 cm. long.
39. *S. hypoleuca*
HH. Petiole 1–3 mm. long; lvs. pale green beneath, 1.5–3 cm. long.40. *S. caesia*
FF. Lvs. more or less pubescent.
G. Brts. and petioles pubescent.
H. Lvs. 3–8 cm. long, acute or acuminate, villous; petiole 2–8 mm. long.
25. *S. glauca*
HH. Lvs. 1–3 cm. long, obtusish to acute, silky beneath; petiole 1–3 mm. long.....32. *S. repens*
GG. Brts. and petioles glabrous, at least at maturity; lvs. acuminate, 4–8 cm. long; petiole 5–15 mm. long.....40. *S. heterochroma*
EE. Lvs. 10–20 cm. long, elliptic or elliptic-obovate, rounded or subcordate at base.
17. *S. magnifica*
DD. Lvs. toothed.
E. Lvs. quite glabrous at maturity.
F. Lvs. reticulate beneath.
G. Lvs. acute or acutish, 4–9 cm. long.....38. *S. pyrifolia*
GG. Lvs. acuminate to acute, 6–18 cm. long.....4. *S. cardiophylla*
FF. Lvs. not reticulate beneath.
G. Lvs. distinctly acuminate, usually rounded at base.
H. Lvs. caudate-acuminate.....5. *S. amygdaloides*
HH. Lvs. acuminate.
I. Midrib of lvs. puberulous above.....48. *S. cordata*
II. Midrib of lvs. glabrous above; lvs. very glaucous beneath.
46. *S. glaucophylloides*
GG. Lvs. acute or abruptly short-acuminate, usually cuneate at base and often broadest above the middle.
H. Lvs. always alternate.
I. Lvs. usually 5–10 cm. long, generally oblong.....26. *S. discolor*
II. Lvs. usually 3–6 cm. long, generally elliptic.
J. Petiole 1–4 mm. long; lvs. sometimes subcordate, usually stipulate.
47. *S. hastata*
JJ. Petiole 3–10 mm. long; lvs. never subcordate, without or with minute stipules.....43. *S. phylicifolia*
HH. Lvs. often subopposite.....59. *S. purpurea*
EE. Lvs. slightly pubescent.
F. Lvs. more or less acuminate, generally oblong.
G. Petiole 2–6 mm. long: brts. glabrous: lvs. oblong-lanceolate to lanceolate.
54. *S. Rehderiana*
GG. Petiole 5–15 mm. long; young brts. pubescent: lvs. usually oblong.
H. Lvs. cuneate at base, 4–8 cm. long.
I. Pubescence of white and brown hairs: lvs. rarely subentire.
26. *S. discolor*
II. Pubescence of white hairs: lvs. often subentire or entire.
36. *S. Bebbiana*
HH. Lvs. often rounded or nearly so at base, larger.
I. Lvs. to 20 cm. long, reticulate beneath.....15. *S. phanera*
II. Lvs. to 12 cm. long, not reticulate.....27. *S. Wallichiana*
FF. Lvs. acute or abruptly acuminate, elliptic to broad-oblong.
G. Lvs. 6–12 cm. long.
H. Winter-buds pubescent; petiole 3–8 mm. long: lvs. obovate-oblong to oblong.....62. *S. gracilistyla*
HH. Winter-buds glabrous or nearly so; petiole 5–15 mm. long.
I. Lvs. generally oblong.....27. *S. Wallichiana*
II. Lvs. generally elliptic.....28. *S. Caprea*
GG. Lvs. 3–6 cm. long.
H. Lvs. reticulate beneath, not turning black in drying.....29. *S. aurita*
HH. Lvs. not or slightly reticulate, turning black in drying.
42. *S. myrsinifolia*
AA. Lvs. densely pubescent or tomentose beneath.
B. Lvs. villous, with rather loosely appressed long hairs or floccose-tomentose.
C. Lvs. broad-elliptic to oblong-lanceolate or oblanceolate.
D. Lvs. crenate or serrate.
E. Lvs. glandular-serrulate, green beneath, cordate: brts. densely pubescent.
45. *S. adenophylla*
EE. Lvs. crenulate or crenate-serrate.
F. Lvs. obtuse or acutish, crenulate, 2–6 cm. long.....22. *S. vestita*

FF. Lvs. acute to acuminate, crenate-serrate, larger.
G. Lvs. crenate-serrate, sometimes obscurely so, 5–8 cm. long. .30. *S. cinerea*
GG. Lvs. of shoots with rather prominent acuminulate teeth, up to 16 cm. long. 31. *S. Medemii*

DD. Lvs. entire or indistinctly toothed.
E. Lvs. subsessile, elliptic-oblong to oblanceolate.....24. *S. brachycarpa*
EE. Lvs. petioled.
F. Stipules ovate, acute, about as long as petiole: lvs. broad-elliptic to elliptic. 51. *S. lanata*

FF. Stipules small or wanting.
G. Lvs. 5–16 cm. long; brts. densely tomentose.....52. *S. Hookeriana*
GG. Lvs. 3–8 cm. long; brts. thinly villous, becoming glabrous.
H. Pubescence of lvs. loose, of long straight hairs.....25. *S. glauca*
HH. Pubescence of lvs. dense, of matted hairs.....55. *S. lapponum*
CC. Lvs. lanceolate or oblong-lanceolate to linear-lanceolate.
D. Brts. floccose-tomentose.....41. *S. candida*
DD. Brts. villous.
E. Lvs. oblong-lanceolate to lanceolate, entire or subentire.....25. *S. humilis*
EE. Lvs. narrow-lanceolate to linear, serrulate toward the apex.....57. *S. incana*
BB. Lvs. closely and densely silky-pubescent beneath.
C. Brts. pubescent.
D. Lvs. more than 5 cm. long.
E. Lvs. oblong-obovate to oblanceolate.....63. *S. sitchensis*
EE. Lvs. lanceolate to narrow-lanceolate.....56. *S. viminalis*
DD. Lvs. 6–30 mm. long.
E. Lvs. with 5–8 pairs of lateral veins, usually entire.....32. *S. repens*
EE. Lvs. with 10 or more closely set pairs of lateral veins, usually remotely denticulate.....61. *S. Bockii*
CC. Brts. glabrous.
D. Lvs. serrulate.....10. *S. jessoensis*
DD. Lvs. entire or indistinctly serrulate.....44. *S. subcoerulea*

Prostrate shrubs with often rooting stems

A. Petiole 8–25 mm. long: lvs. broad-elliptic to broad-obovate, entire.....21. *S. reticulata*
AA. Petiole 2–10 cm. long.
B. Lvs. pubescent beneath, rugulose above, crenulate.....22. *S. vestita*
BB. Lvs. glabrous or glabrescent.
C. Lvs. crenate-serrulate, suborbicular, green on both sides.....18. *S. herbacea*
CC. Lvs. entire or only slightly toothed near apex.
D. Lvs. reticulate beneath and pale or glaucous.
E. Lvs. 1–2 cm. long; petiole 2–6 mm. long.....20. *S. uva-ursi*
EE. Lvs. 2–3.5 cm. long; petiole 4–10 mm. long.....23. *S. petrophila*
DD. Lvs. not reticulate, green on both sides.....19. *S. retusa*

1. **S. nígra** Marsh. Black W. Tree to 12 m., with dark brown, rough and scaly bark and slender spreading brs.; brts. yellowish, slightly pubescent when young: lvs. linear-lanceolate to lanceolate, 6–12 cm. long, cuneate, acuminate, serrulate, pale green and sometimes pubescent on the veins beneath; petiole 3–6 mm. long; stipules semicordate, persistent: catkins on leafy brts.; staminate 3–5 cm. long, slender, pistillate 4–8 cm. long; stamens 3–7; ovary glabrous; pedicel much longer than gland; stigma subsessile. S.S.9:t.462. H.H.78,79(b). N. B. to w. Ont., Fla. and Cal. Cult. 1809. Zone III.—Var. **falcàta** Torr. Lvs. only 4–6 mm. wide, falcate, green on both sides. S.S.9:t.463. Mass. to Ohio and Fla.—Graceful species.

S. n. × *alba* = **S. Hankensònii** Dode. Lvs. lanceolate, glaucous beneath; stamens 2–4; ovary sessile; style short. G.F.8:425. Orig. before 1890.

2. **S. pentándra** L. Bay W. Tree to 20 m.; bark gray, fissured; brts. lustrous, brownish green; young growth viscid; buds yellow: lvs. elliptic or ovate to elliptic-lanceolate, 4–12 cm. long, short-acuminate, rounded or subcordate at base, glandular-denticulate, lustrous dark green above, lighter beneath, midrib yellow; petiole 6–10 mm. long, glandular; stipules oblong-ovate, often small: catkins on leafy stalks, its lvs. serrulate; the staminate 3–5, the pistillate 3–6 cm. long; stamens 5–12, villous to the middle; ovary glabrous; pedicel slightly longer than glands; style short; stigma 2-lobed. R.I.11:t.612,f.1268(c). S.E.8:t.1303(c). H.W.2,1:103. (*S. laurifolia* Wesm.) Eu. to Cauc.; escaped in the E. States. Long cult. Zone IV.—One of the handsomest willows with its lustrous dark green foliage and the golden yellow catkins in spring.

S. p. × *fragilis* = **S. Meyeriàna** Rostk. Lvs. generally oblong-elliptic, acuminate, broad-cuneate, often glaucescent beneath; stamens usually 4; pedicel 2–3 times as long as ventral gland. R.I.11:t.611(c). S.E.8:t.1304–5(c). Cambridge Brit. Fl.2:t.19. (*S. cuspidata* Schultz). Eu. Cult. 1829.—*S. p.* × *alba* = **S. Ehrhartiàna** Sm. Lvs. oblong, slender-pointed, usually silky at first, green beneath: stamens usually 4. Andersson, Monog. t.3,f.27. C.S.t.39a-c. (*S. hexandra* Auth., not Ehrh.) Eu. Cult. 1894.—?*S. p.* × *purpurea* = **S. heterándra** Dode. Lvs. lanceolate, remotely serrate, glaucous beneath: stamens 3–5, partly connate. B.F.IV.8:653c. Cauc. Cult. 1910.

Related species are: **S. paraplèsia** Schneid. Tree to 7 m.: lvs. ovate to elliptic-obovate or elliptic-lanceolate, 4–10 cm. long, glaucous or pale green beneath. W. China. Intr. 1908.—**S. seríssima** Fern. Lvs. elliptic-lanceolate to oblong-lanceolate, 4–8 cm. long, glaucous beneath; staminate catkins 1–1.5, pistillate 2–3.5 cm. long: fr. ripening in autumn. Gray Man. ed. 7:322. Que. to Alb., s. to N. J., w. N. Y. Cult. 1880. Zone IV.

3. **S. lùcida** Muhlenb. Shining W. Shrub or tree to 6 m., brts. yellowish brown, lustrous: lvs. ovate-lanceolate to lanceolate, 7–12 cm. long, long-acuminate, broad-cuneate to rounded at base, glandular-serrulate, green and lustrous on both sides, glabrous or pubescent on midrib; petiole 6–12 mm. long, glandular: stipules semicordate, very glandular, usually persistent: catkins on leafy brts.; the staminate 3–6, the pistillate 5–7 cm. long, dense; stamens usually 5, villous to the middle; stigmas subsessile. S.S.9:t.453. H.H.80,81(b). Nfd. to N. W. Terr., s. to N. J., Ky. and Neb. Cult. 1830. Zone II?—Handsome willow with lustrous lvs.

Related species are: **S. lasiándra** Benth. Tree to 20 m.; brts. pilose or tomentose at first: lvs. lanceolate to narrow-lanceolate, glaucous or glaucescent beneath and pubescent at first: stamens 5–9; scales glandular-dentate, those of pistillate catkins often entire. S.S.9:t.469,470. A.I.1:489. (*S. Lyallii* Heller, *S. lancifolia* Anders.) B. C. and Alb. to Calif., Mont., Colo. and N. Mex. Cult. 1883. Zone VI?—**S. lóngipes** Shuttlew. Tree to 10 m., with spreading or slightly drooping brs.: lvs. lanceolate to oblong-lanceolate, 6–18 cm. long, subcordate to broad-cuneate at base, whitish and slightly pubescent beneath; petiole glandless; stipules foliaceous, acute: catkins 5–10 cm. long; stamens 3–7; caps. slender-stalked. S.S.9:t.465, 466. (*S. occidentalis* Bosc, not Walt.) Va. to Fla., Cuba.—Var. **Wârdii** Schneid. Lvs. very glaucous beneath; stipules broad, obtuse: catkins slenderer; pedicel less than half as long as caps. S.S.9:t.464. H.H.76,77(b). (*S. Wardii* Bebb.) Md. to Mo., Miss. and Ala. Intr. 1895. Zone VI?

4. **S. cardiophýlla** Trautv. & Mey. Tree to 25 m.: lvs. elliptic to oblong-ovate, 6–15 cm. long, acuminate, usually rounded at base, glandular-serrate, glaucous and reticulate beneath, glabrous; petiole 1–3 cm. long, usually glandless; catkins slender, the staminate 4–8, the pistillate to 10 cm. long; stamens 5–9; ovary short-stalked, glabrous; style distinct, cleft at apex; stigmas slender, 2-parted. Tokyo Bot. Mag. 19(18):t.2. Middendorf, Reise Sib. 1.2,2:t.19,20a-i. Saghal., Korea, Japan. Intr. 1919. Zone V.

5. **S. amygdálina** L. Almond-leaved W. Shrub or tree, sometimes to 10 m.; bark separating in flakes; brts. slightly pubescent at first, reddish brown or olive-brown: lvs. lanceolate or ovate-lanceolate, 5–10 cm. long, acuminate, cuneate or nearly rounded at base, serrulate, lustrous and dark green above, light or bluish green beneath, glabrous; petiole 6–12 mm. long, glandular; stipules usually semicordate, serrate: catkins on short leafy brts.; the staminate 3–8, the pistillate 3–7 cm. long; stamens 3, rarely 2, pilose at base: pistillate fls. with 1 gland; ovary long-conical, glabrous; pedicel 3–5 times as long as gland; stigmas subsessile, often emarginate. R.I.11: t.604(c). S. E.8:t.1313,1315(c). H.W.2:t.29,f.1–5(c). (*S. triandra* L., *S. Hoppeana* Willd.) Eu., W. Asia, Siber. Long cult. Zone V.—Var. **glaucophýlla** Seemen. Lvs. grayish or whitish beneath. (Var. *discolor* Wimm. & Grab., *S. triandra* var. *amygdalina* Babingt.)—Var. **cóncolor** Wimm. & Grab. Lvs. light green beneath (*S. triandra* L.)—Var. **angustifòlia** Seemen.

Lvs. narrow-lanceolate, green or grayish beneath.—Much cult. in Eu. for basket-making.

S. a. × *fragilis* = **S. speciòsa** Host. Brts. brown: lvs. oblong to lanceolate, dark green above, pale or bluish green beneath: stamens 2–3; pistillate fls. with usually 1 gland. Host,Sal.t.17(c). C.S.t.23a-c. (*S. alopecuroides* Tausch.) Eu. Cult. 1821.—*S. a.* × *viminalis* = **S. mollíssima** Ehrh. Lvs. lanceolate, serrate or undulate-denticulate, thinly gray-tomentose beneath: ovary pubescent. I.T.4: t.140. (*S. multiformis* Doell.) Eu. Cult. 1809—Here belong also **S. undulàta** Ehrh. (*S. lanceolata* Sm.) with less pubescent lvs. and usually glabrous ovary (S.L.8:t.1312), **S. hippophaifòlia** Thuill. with linear-lanceolate glabrate lvs. and villous ovary (R.I.11:t.599), and **S. Trevirànі** Spreng. with linear-lanceolate glabrate, long-acuminate lvs. and usually glabrate ovary (C.S.t.24s).

A related species is **S. Medwedéwii** Dode. Small glabrous shrub: lvs. linear-lanceolate, 6–10 cm. long and 5–6 mm. wide, remotely glandular-serrate, bluish white beneath; pistillate catkins dense. B.F.55:653g. Asia Minor. Cult. 1910.

6. **S. amygdaloïdes** Anders. Peach-leaved W. Small tree, sometimes to 20 m., with ascending brs.; brts. red-brown or orange, lustrous, glabrous: lvs. lanceolate or ovate-lanceolate, 8–12 cm. long, cuspidate-acuminate, broad-cuneate to rounded at base, sharply serrulate, pale or glaucous beneath, pubescent when young, soon glabrous; petiole 6–15 mm. long, glandless; catkins on leafy brts., the staminate 3–5, the pistillate 4–10 cm. long, in fr. very loose; stamens 5–9, slightly pilose at base; pedicel nearly as long as caps. S.S.9:t.467. H.H.74,75(b). Que. to B. C., s. to N. Y., Tex. and Ore. Cult. 1895. Zone IV.

7. **S. frágilis** L. Crack W. Tree to 30 m., with rough thick bark; brts. glabrous, olive, lustrous, growing at an angle of 60–90° to the br., brittle at base: lvs. oblong-lanceolate to narrow-lanceolate, 6–16 cm. long, long-acuminate, cuneate, glandular-serrate, lustrous, light green or bluish green beneath, usually slightly silky at first, soon glabrous; petiole 6–25 mm. long, glandular; stipules semicordate, serrate: catkins on leafy stalks, its lvs. entire; the staminate 2–4.5, the pistillate 3–6 cm. long; fls. of both sexes with 2 glands; filaments villous at base; ovary conic-ovoid; pedicel as long or longer than glands. R.I.11:t.609(c). H.W.2:t.28(c). H.H.82,83(b). Kew Bull. 1907: 312,t.(h). Eu., W. Asia, sometimes escaped in the E. States. Long cult.—Var. **bullàta** Spaeth. A compact subglobose bush. (*S. b.* Hort.)—Var. **decípiens** Anders. Brts. yellowish or reddish at first; winter-buds dark brown, often nearly black: lvs. lanceolate, pale green beneath. F.Sa.t.29(c). S.E.8:t.1307(c). (*S. d.* Hoffm.) Possibly a hybrid with *S. amygdalina.*

S. f. × *alba* = **S. rúbens** Schrank. Intermediate between the parents and very variable: lvs. usually silky when young, becoming glabrous, usually glaucous beneath; pistillate fls. usually with 1 gland; pedicel short; style short. (*S. Russelliana* Willd.)—Var. **víridis** Schneid. Lvs. pale green beneath, glabrescent. S.E.8: t.1306(c, as *S. fragilis*). (*S. v.* Fries.)—Var. **palústris** Schneid. Lvs. silky-pubescent. Host, Sal.t.24–5(c). (*S. p.* Host, *S. Russelliana* Sm.)—*S. f.* × *pentandra* = *S. Meyeriana;* see under No. 2.—*S. f.* × *babylonica* = *S. blanda*; see No. 13.—*S. f.* × *amygdalina* = *S. speciosa*; see under No. 5.

8. **S. Matsudàna** Koidz. Tree to 13 m., with upright or spreading brs., yellowish or olive-green and glabrous when young: lvs. narrow-lanceolate, 5–8 cm. long, long-acuminate, rounded or rarely cuneate at base, sharply glandular-serrate, glaucescent or whitish beneath, slightly silky at first, soon glabrous; petiole 2–8 mm. long; stipules lanceolate, often wanting: catkins 1–1.5 cm. long; peduncle with entire lvs.; glands obtuse; ovary subsessile; style wanting or very short. C.C.51. B.D.1923:t.14(h). Transbaicalia, N. China, Manch., Korea. Intr. 1905. Zone V.—Var. **umbraculífera** Rehd. A form with a broad umbrella-shaped or semiglobose head. U.S.Intr.80:t

(h). B.D.1923:t.15(h). Intr. 1906.—Var. **péndula** Schneid. Brs. pendulous. Intr. 1908.

9. **S. elegantíssima** K. Koch. Thurlow Weeping W. Tree with long pendulous brs.; brts. brown, glabrous, lustrous: lvs. lanceolate, 8–15 cm. long, about 2 cm. broad, long-acuminate, sharply serrulate, bright green above, bluish green beneath, glabrous except midrib above; petiole 1–1.5 cm. long: stipules semicordate: pistillate catkins to 5 cm. long; the peduncle with entire lvs.; ovary short-stalked, thinly pubescent near base; style short; ventral gland emarginate or 2-parted, slightly longer than pedicel. M.G.13: 88(h). Origin unknown, possibly Japan. Intr. about 1860. Zone V.—Ornamental tree with long pendulous brs.

10. **S. jessoénsis** Seemen. Tree to 25 m., with spreading brs.; brts. light brown, grayish pubescent when young; winter-buds pubescent: lvs. lanceolate to narrow-lanceolate, 5–9 cm. long, acuminate, mucronate-serrulate, densely silky when young, later slightly silky above, densely so and glaucescent beneath; petiole 2–5 mm. long; stipules ovate-lanceolate, small, silky: catkins on short leafy stalks, the staminate 2–3 cm. long, rather loose; scales oblong-elliptic, slightly villous at base; filaments villous at base; pistillate catkins dense, to 4.5 cm. long; scales obtuse or emarginate; ovary pubescent; stigmas oblong, undivided. Seemen, Sal. Jap. t.3,f.f-l. Japan. Intr. 1897. Zone V.

A related species is **S. koreénsis** Anders. Tree to 20 m.; glabrous: lvs. lanceolate to narrow-lanceolate, 6–12 cm. long, sharply serrulate; petiole 5–10 mm. long, yellowish like the midrib; style distinct, rather long; ovary pubescent or glabrate; style emarginate. Korea. Intr. 1919. Zone V.—Other species which may belong here are:

S. lispóclados Dode. Brts. reddish, glabrous: lvs. subsessile, ovate-lanceolate, about 6 cm. long, glandular-serrate, bluish white beneath, glabrous: staminate catkins 1–1.5 cm. long; stamens 2–3. B.F.55:653H. Asia Minor. Cult. 1910.—**S. Tomínii** Dode. Brts. dark brown, glabrous, young growth villous: lvs. lanceolate, 8–10 cm. long, nearly rounded at base, remotely serrulate, glabrate above, appressed-silky beneath and bluish white; petiole 5–8 mm. long: staminate catkins to 2 cm. long; stamens 2, connate at base. B.F.55:653A. Cauc. Cult. 1910.—**S. óxica** Dode. Brts. reddish brown, glabrous, young growth silky: lvs. lanceolate to 12 cm. or more long, cuneate, serrate, bluish gray and appressed-silky beneath; staminate catkins 4–6 cm. long; scales lanceolate; ovary glabrous, short-stalked. B.Fr.55:653B. Turkest. Cult. 1910.

11. **S. alba** L. White W. Tree to 25 m., with spreading brs. pendent at ends; brts. silky when young, olive-brown, spreading at an acute angle (30–45°) from the br.: lvs. lanceolate, 4–10 cm. long, acuminate, cuneate, serrulate, silky beneath; petiole 6–12 mm. long, with small glands; stipules lanceolate: catkins on leafy stalks, 4–6 cm. long; stamens villous at base; ovary subsessile, conic-ovoid, glabrous; style short. R.I.11:t.608(c). S.E.8: t.1309(c). H.W.2,1:100(h),t.27(c). S.H.1:35(h). Eu. and N. Afr. to C. Asia. Long cult. Zone I.—Var. **ovàlis** Wimm. Lvs. elliptic-oblong.—Var. **calva** G. F. W. Mey. Brs. more upright; brts. dark brown: lvs. slightly silky at first, finally glabrous or nearly so; ovary slightly stalked. (Var. *coerulea* W.D. Koch, *S. coerulea* Sm.—Cricket-bat W.) S.E.8:t.1310(c). B.S.2:480,t(h). E.H.7:t.381(h).—Var. **serícea** Gaud. Lvs. densely silky beneath and more or less so above. (Var. *leucophylla* Hartig, var. *splendens* Anders., var. *argentea* Wimm., var. *regalis* Hort.)—Var. **vitellìna** Stokes. Brts. yellow: lvs. narrow-lanceolate, long-acuminate, glaucous beneath and slightly silky; catkins longer; scales longer. F.Sa.t.137(c). S.E.8:t.811(c). (*S. v.* L.)—Var. **chermesìna** Hartig. Brts. bright red. (*S. vitellina* var. *bitzensis* Spaeth.)—Var. **trístis** Gaud. With bright yellow pendulous brs. M.G.13:88(h). 32:322(h). Gn.86:603(h);89:143(h). (Var. *vitellina pendula* Rehd., *S. chrysocoma* Dode).—

Planted as timber-tree, also var. *vitellina* as basket-willow and var. *tristis* for ornament.

S. a. × *nigra* = *S. Hankensonii;* see under No. 1.—*S. a.* × *pentandra* = *S. hexandra;* see under No. 2.—*S. a.* × *fragilis* = *S. rubens*; see under No. 7.—*S. a.* × *babylonica* = *S. sepulcralis;* see under No. 12.

12. **S. babylônica** L. WEEPING W. Tree to 10 m., with long pendulous brs.; brts. brown, glabrous, only young growth slightly silky: lvs. lanceolate to linear-lanceolate, 8–16 cm. long, long-acuminate, cuneate, serrulate, dark green above, grayish green beneath, with distinct venation, glabrous; petiole 3–5 mm. long; stipules rarely developed, ovate-lanceolate: catkins short-stalked, curved, the staminate to 4, the pistillate to 2 cm. long; scales villous only at base, nearly as long as ovary; ovary sessile or subsessile, glabrous; style very short; stigmas oblong, 2-lobed; gland about ⅓ as long as ovary. Brandis, For. Fl. t.59. Seemen, Sal. Jap. t.3a-e. Gn.M.31:318–20(h). B.S. 1:64(h). (*S. pendula* Moench.) China. Intr. about 1730. Zone V or VI.—Var. **crispa** Loud. Lvs. folded and spirally curved. F.Sa.t.41(c). (Forma *annularis* Aschers., *S. annularis* Forbes, *S. Napoleonis* F. Schultz.)—Handsome weeping tree, often planted; frequently confused with *S. elegantissima* and *S. blanda.*

S. b. × *alba* = **S. sepulcrâlis** Simonk. Tree with spreading brs. and pendulous brts., similar to *S. babylonica*, but of more vigorous growth and less weeping; young growth silky: lvs. bluish or whitish beneath and silky-pubescent; catkins pistillate or androgynous, thicker, their axis more pubescent; scales shorter, acute, long-ciliate. B.F.45:t.6. C.S.t.22e-i. Gn.55:19(h). B.S.1:98.t(h). (*S. Salamonii* Carr., *S. babylonica* var. *Salamonii* Simon-Louis.) Orig. before 1864. Zone V or IV.—*S. b.* × *fragilis* = *S. blanda;* see No. 13.

13. **S. blanda** Anders. (*S. babylonica* × *fragilis*). WISCONSIN WEEPING W. Tree with widespreading head and long pendulous brs.; brts. dull green or brown, brittle at base: lvs. lanceolate to narrow-lanceolate, 8–15 cm. long, long-acuminate, cuneate, serrulate, dark green above, bluish green beneath, glabrous; petiole 5–12 mm. long; stipules ovate or oblong-ovate: catkins slender, 2–3 cm. long; stamens pubescent at base; ovary short-stalked; pedicel about twice as long as gland; style short; stigmas emarginate. Andersson, Monog. t.3,f.31. C.S.t.22d. M.G.13:89(h). (*S. babylonica* var. *dolorosa* Rowlee, *S. Petzoldii pendula* Hort., ? *S. pendulina* Wender.) Orig. before 1830? Zone V.

14. **S. longifôlia** Muhlenb. SANDBAR W. Shrub 1–4 m. tall, forming thickets, sometimes a slender tree to 8 m., with rather smooth bark; brts. orange to purplish red, glabrous: lvs. linear-lanceolate, 6–10 cm. long, acuminate, cuneate, remotely denticulate, bright green, distinctly veined, silky beneath when young, later glabrous; petiole 3–5 mm. long; stipules minute or wanting: catkins on rather long leafy brts., the staminate dense, 2–4 cm. long, sometimes panicled, the pistillate to 5 cm. long in fr. and rather loose; ovary silky when young, short-stalked; scales ovate or obovate; stigmas subsessile, with short elliptic lobes; stamens pilose at base. S.S.9:t.474. H.H.84,85(b). (*S. fluviatilis* Sarg., in part, not Nutt.) Que. to Va. and La., w. to Man., Wyo., N. Mex. and n. Mex. Cult. 1873. Zone IV.

Related species are: **S. exígua** Nutt. Shrub or small tree to 5 m.: lvs. subsessile, linear to linear-lanceolate, nearly entire, yellowish green, silky. B.T.195. A.I.1:493. B. C. to Calif., w. to Mont., Idaho, Colo. and N. Mex. Intr. 1921. Zone V?—**S. melanôpsis** Nutt. Shrub or small tree; lvs. elliptic-lanceolate to oblanceolate, 4–6 cm. long, serrulate, rarely nearly entire, glaucous beneath, silky when young, soon glabrous: petiole 1–5 mm. long; catkins 5–7 cm. long; scales linear-oblong; ovary glabrous. A.I.1:493. B. C. to Ore. and Mont. Intr. 1921. Zone V.—**S. argophýlla** Nutt. Shrub or small tree; lvs. subsessile, narrow-lanceolate, 4–8 cm. long, usually entire, silky-pubescent on both sides, silvery-white

beneath: ovary densely pubescent. N.S.1: t.20(c). B.T.196. Wash. and Mont. to Calif. and Tex. Cult.?

15. **S. phánera** Schneid. Large shrub or tree to 12 m.; brts. tomentulose at first, soon glabrous: lvs. ovate-lanceolate or broadly elliptic-lanceolate, 6–20 cm. long, short-acuminate or acute, rounded at base, crenate-denticulate, sparingly puberulous or glabrate and impressed-reticulate above, tomentose beneath, finally glabrescent and reticulate beneath, midrib and the numerous parallel veins glabrate and yellowish; petiole 1–2 cm. long; stipules semi-cordate, glandular-serrate; staminate catkins 10–12 cm. long, slender; rachis villous; filaments villous at base; scales broad-ovate, rounded, yellow-brown, villous on both sides. W. China. Intr. 1911. Zone (V).—Handsome willow with large lvs.

16. **S. moupinénsis** Franch. Shrub or tree to 6 m.; brts. glabrous, becoming orange to red-brown: lvs. narrow-elliptic to oblong, 6–12 cm. long, acute or short-acuminate, broad-cuneate or rounded at base, sharply glandular-serrulate, glabrous above, light green and reticulate beneath, silky on the veins or quite glabrous; petiole 1–1.5 cm. long, glabrous, glandless; stipules wanting: catkins on short leafy brts., the staminate 6–9, the pistillate to 14 cm. long, loose, with the fls. subverticillate; scales yellow-brown, glabrous or nearly so, persistent; rachis sparingly pubescent; ovary glabrous, short-stalked; style about ⅓ as long as ovary, with oblong bifid stigmas. W. China. Intr. 1911. Zone (V).—Handsome willow with large bright green lvs.

A closely related species is **S. Fargèsii** Burk. Lvs. elliptic to elliptic-oblong, up to 18 cm. long, usually more densely pubescent beneath; petiole to 2.5 cm. long: staminate catkins to 12, pistillate to 16 cm. long; scales long-villous; style slender; caps. subsessile. B.J.29:t.3a-f. W. China. Intr. 1911. Zone (V).

17. **S. magnífica** Hemsl. Shrub or small tree to 6 m.; glabrous; young shoots and buds purple: lvs. elliptic or elliptic-obovate, 10–20 cm. long, abruptly acuminate, rounded or subcordate at base, entire or denticulate near apex, dull bluish green above, glaucous beneath; petiole 1–3.5 cm. long, purplish: catkins on leafy brts., glabrous, the staminate 10–18, the pistillate 18–30 cm. long in fr.: ovary subsessile; style distinct. J.L.39:f.148. W. China. Intr. 1903. Zone VI or VII.—Very distinct and handsome willow, remarkable for its large and broad lvs. and the very long catkins.

A related species is **S. pella** Schneid. Shrub: lvs. elliptic-oblong to elliptic, 4–13 cm. long, acute or obtusish, serrulate, silky-pubescent on the veins beneath; petiole 6–15 mm. long: fruiting catkins 4–9 cm. long; scales glabrous; rachis pubescent. W. China. Intr. 1911.

18. **S. herbácea** L. Dwarf W. Depressed shrub with partly underground creeping stems and slender angled brts. to 15 cm. long; young growth slightly pubescent, soon glabrous: lvs. suborbicular, 8–20 mm. long, rounded or emarginate at apex, rounded or cordate at base, crenulate-serrate, bright green and lustrous on both sides, reticulate-veined, glabrous; petiole 4–8 mm. long: catkins on 2-lvd. brts., 4–10-fld.; scales obovate, obtuse, yellowish, glabrous or nearly so; glands mostly incised or lobed; ovary short-stalked, glabrous; style short, with 2-parted stigmas. R.I.11:t.557,f.1182(c). S.E.8:t. 1378(c). S.L.377(h). High Mts. of Eu. and N. Asia; arctic N. Am. s. to N. H. Cult. 1789. Zone I.

S. h. × *formosa* = **S. simulátrix** B. White. Creeping shrub: lvs. suborbicular to ovate, to 1.5 cm. long: catkins many-fld., on leafy brts.; ovary pubescent. Gs.5:91(h). Switzerland. Cult. 1922.

A similar species is **S. polàris** Wahlenb. Lvs. smaller, entire: scales dark at apex; stamens sometimes slightly connate at base; pistillate fls. with 1 gland; ovary pubescent. S.H.1:f.19g,27d. S.L.67(h). M.G.25:141(h). Arctic Eu. and Asia. Cult. 1910. Zone I.

19. **S. retùsa** L. Prostrate shrub with rooting glabrous brs.: lvs. obovate to oblong, 8–35 mm. long, obtuse, rarely emarginate or acutish, cuneate, entire or with few small teeth, green on both sides, glabrous or slightly pubescent beneath; petiole 2–5 mm. long: catkins on leafy brts., the staminate to 18 mm. long, loose, the pistillate to 2 cm. long; scales oval to oblong, yellowish, glabrous or sparingly hairy; pedicel ¼ as long as the glabrous ovary; style about ⅓ as long as ovary, bifid; stigmas short, bifid. R.I.11:t.558f. 1186–7(c). H.W.2,1:107a. Mts. of Eu. Intr. 1763. Zone I.

S. r. × *myrsinifolia* = **S. Cottétii** Lagger. Low, usually prostrate: lvs. elliptic to oblong, 2–4 cm. long, obtuse or acute, serrulate, pubescent when young; catkins short-cylindric; scales darker toward apex, pubescent. C.S.2:t.12e-g. G.W.9: 542(h). Eu. Alps. Cult. 1905. Zone V.

A related species is **S. serpyllifòlia** Scop. Lvs. 4–8 mm. long: catkins about 5 mm. long; pedicel shorter than ventral gland. R.I.11:t.558,f.1185(c). (*S. retusa* var. *s.* Ser.) Alps and mts. of s. e. Eu. Cult. 1898.

20. **S. ùva-úrsi** Pursh. Bearberry W. Prostrate shrub with glabrous brs. to 30 cm. long: lvs. elliptic to obovate, 5–25 mm. long, acute or obtuse, cuneate, slightly toothed or entire, lustrous above, pale or glaucous beneath, strongly veined; petiole 2–4 mm. long; catkins on slender leafy brts., about 1 cm. long, the pistillate 2–4 cm. long in fr.; scales obovate, rose-red at apex, silky; usually 1 stamen, rarely 2; caps. conic-ovoid, glabrous, short-stalked; style short, but distinct. Fl. Dan.17:t.3053(c). B.B.1:601. (*S. Cutleri* Tuckerm.) Lab. to Alaska, s. to Alpine summits of N. Y. and N. H. Intr. 1880. Zone I.

21. **S. reticulàta** L. Low procumbent shrub; brts. angled, glabrous: lvs. broad-elliptic to broad-obovate, 1.5–5 cm. long, obtuse, sometimes emarginate, broad-cuneate to subcordate at base, entire, rugulose above, gray-green and usually silky beneath at first, soon glabrous, reticulate; petiole 8–20 mm. long; catkins slender, long-peduncled, on leafy brts., the staminate to 2, the pistillate to 3 cm. long; scales light brown, oval, villous; stamens villous below the middle; ovary sessile, tomentose; style very short. R.I.11:t.557, f.1184(c). S.E.8:t.1369(c). M.G.25:124(h). Gs.5:91(h). (*S. orbicularis* Anders.) Eu., N. Asia and in N. Am. from Lab. to Alaska. Cult. 1789. Zone I.—An attractive and distinct species adapted for the Alpine rock-garden.

22. **S. vestìta** Pursh. Low shrub to 20 cm., usually prostrate; young brts. pubescent: lvs. obovate or elliptic, 2–5 cm. long, obtuse or emarginate, broad-cuneate to rounded at base, slightly crenate, silky above at first, soon dark green and glabrous, silky-tomentose beneath; petiole 4–8 mm. long: catkins on leafy brts., the staminate to 3.5 cm. long, the pistillate in fr. to 5 cm. long; fls. similar to those of No. 21. A.I.1:507. B.B.1:603. Lab. and Que. to Man.—Var. **erécta** Anders. Upright to 50 cm. tall: lvs. thinner, narrower, often acutish: caps. more obtuse. A.I.1:507. (*S. Fernaldii* Blankinsh.) B. C. to Calif. and Mont. Intr. 1892? Zone V.

23. **S. petróphila** Rydb. Creeping shrub to 10 cm. tall: lvs. obovate or elliptic to oblanceolate, 1–3 cm. long, obtuse or acutish, cuneate, entire, bright green above, slightly paler and strongly veined beneath, glabrous or sparingly silky at first; petioles 3–6 mm. long: catkins on leafy brts., 2–3 cm. long; scales obovate, blackish, sparingly silky-villous; caps. sessile, white-villous; style distinct, 0.5 mm. long, with elongated bifid stigmas. A.I.1:500. B. C. and Alb. to Calif., Wyo., Colo. and N. Mex. Intr. 1922. Zone V.

24. **S. brachycárpa** Nutt. Upright shrub to 1 m.; brts. densely villous: lvs. subsessile, elliptic-oblong to oblanceolate, 1–3 cm. long, entire, villous on

both sides, more densely so beneath: catkins on leafy brts., 1–2 cm. long, dense; scales obovate, yellowish, villous; ovary subsessile, densely villous; style very short; caps. 4–5 mm. long. S.H.1:f.26e,27b-b. (*S. desertorum* Anders., not Richards.) B. C. and Wash. to Man., Colo. and Utah. Intr. about 1890. Zone V.

25. **S. glaûca** L. Shrub to 1 m.; young brts. silky or whitish tomentose, later brown or yellowish, lustrous: lvs. lanceolate to obovate, 3–8 cm. long, acute at ends or sometimes obtuse at apex, entire, silky above, later glabrate or glabrous, silky- or white-tomentose beneath and grayish green or glaucous, rarely green beneath; petiole to 1.5 cm. long; stipules usually small or obsolete: catkins on leafy stalks, to 4.5 cm. long; scales oval to oblong, dark above the middle; filaments glabrous or villous at base; ovary short-stalked, silky or tomentose; ventral gland truncate or 2-parted, as long or longer than pedicel; style not more than ⅓ as long as ovary, with oblong, deeply emarginate stigmas. R.I.11:t.571,f.1214(c). H.W.2,1:122,f.206. Eu. Alps; N.W. N. Am., from Alaska to B. C., Alb. and Mont. Cult. 1813. Zone I?—The Am. plant has been separated from the Eu. type as var. **acutifòlia** Schneid. (*S. Seemannii* Rydb.), differing chiefly in the usually well-developed stipules, the longer pedicels, sometimes twice as long as the gland and in the glabrescent filaments, and as var. **glabréscens** Schneid., similar, but less pubescent.

A closely related species is **S. pyrenàica** L. Lower: lvs. not more than 3 cm. long, scales usually pale; pistillate fls. with 1 gland. C.S.1:t.10B. Trautvetter, Sal. Frig. t.4. Gs.5:90(h). Pyrenees. Cult. 1875.—Another related species is **S. argyrocárpa** Anders. Erect, or ascending, to 0.5 m.: short-petioled, oblong to oblanceolate, 3–5 cm. long, silky-pubescent beneath, entire or crenulate and slightly revolute: catkins 1.5–2.5 cm. long; style elongated; pedicels about ½ as long as the silky caps. B.B.1:603. Anderson, Mon. Sal. t.6,f.60. Lab. and Que. to N. H. Intr. 1883. Zone I.

26. **S. díscolor** Muhlenb. Pussy W. Shrub or small tree to 7 m.; young brts. pubescent at first, soon glabrous: lvs. elliptic-oblong to oblong-oblanceolate, 4–10 cm. long, acute at ends, irregularly crenate-serrate or nearly entire, pubescent when young, glabrous or nearly so at maturity, glaucous beneath, rather thin; petiole 8–25 mm. long; stipules usually conspicuous, semi-cordate, deciduous: catkins before the lvs., subsessile, the staminate dense, to 3.5 cm. long, the pistillate to 7 cm. long in fr.; filaments glabrous; pedicel glabrous, ¼-⅓ as long as the pubescent rostrate ovary; style distinct, short, with narrow bifid stigmas. S.S.9:t.478. F.Sa.t.147(c). H.H.92,93(b). (*S. conifera* Wangh.) N. S. to Man., s. to Va. and Mo. Cult. 1809. Zone I.—Var. **eriocéphala** Anders. Brts. pubescent: lvs. pubescent beneath: catkins smaller.

A closely related species is **S. Scouleriàna** Barratt. Large shrub or tree to 10 m.; lvs. elliptic to oblong-obovate, acute to short-acuminate, entire to slightly crenate-serrulate, white- or rusty-pubescent to glabrous and reticulate beneath: pedicels shorter, villous; stigma sessile. S.M.161. A.I.1:505. (*S. flavescens* Nutt.) Alaska to Mont., n. Calif., Ariz. and N. Mex. Intr. 1918. Zone V.

27. **S. Wallichiàna** Anders. Shrub or small tree; young brts. silky, soon glabrous; winter-buds glabrous: lvs. ovate-lanceolate to oblong-lanceolate, 5–10 cm. long, acuminate, cuneate to broad-cuneate, entire or sometimes serrulate, silky at first, later glabrous and smooth above, glaucous and nearly glabrous or sometimes pubescent beneath, with many lateral veins and indistinct veinlets; petiole 8–15 mm. long: glabrous; stipules small: catkins on short bracted stalks or subsessile, very villous, the staminate 2–3, the pistillate 2–5, in fr. to 10 cm. long; scales black-brown, obtuse; filaments glabrous;

pedicels short, rarely ⅓ as long as the pubescent rostrate ovary; style short, with upright, oval to oblong and emarginate to bifid stigmas. Andersson, Mon. t.5,f.46. Brandis, For.Fl.t.61. Himal., China. Intr. 1911. Zone V.

A related species is **S. lívida** Wahlenb. Low shrub or sometimes small tree to 8 m.; brts. glabrous or nearly so, lustrous: lvs. obovate to oblong-lanceolate, up to 6 cm. long, acute, entire or crenate, glabrous or nearly so; petiole 2–5 mm. long; scales obtuse, yellow, usually dark at apex; pedicel about as long as ovary; style short. R.I.11:567(c). H.W.2,1:118. (*S.* ? *Starkeana* Willd., *S. depressa* E. Fries, not L.) Eu., N. Asia. Cult. 1872. Zone III?—Var. **cinerâscens** Wahlenb. Young brts. and lvs. pubescent. R.I.11:t.567,f.2008(c).

28. **S. cáprea** L. Goat W. Shrub or sometimes tree to 9 m.; young brts. gray-pubescent, later glabrous, brown and lustrous; winter-buds becoming glabrous: lvs. broad-elliptic to oblong, 6–10 cm. long, acute, rarely rounded at base, irregularly and slightly toothed or nearly entire, pubescent at first, finally glabrate, rugulose and dark green above, gray-pubescent beneath and reticulate; petiole 8–20 mm. long; stipules oblique-reniform, serrate: catkins subsessile, with 3–6 bracts at base, densely villous, the staminate oval, 2.5–3 cm. long, dense, the pistillate to 6, in fr. to 10 cm. long; scales lanceolate; filaments glabrous or slightly villous at base; pedicel ⅔ or as long as the gray-pubescent ovary; style wanting or very short; stigma oval, emarginate or bifid; gland short, ⅙ to ¼ as long as pedicel. R.I.11:t.577(c). H.W.2:t. 32(c). S.E.8:t.1331–2(c). Eu. to N. E. Asia and n. Persia. Long cult. Zone V.—Var. **variegàta** West. Lvs. variegated with white. Cult. 1770.—Var. **péndula** Th. Lang. Kilmarnock W. With stiffly pendulous brs. Cult. 1853.—The rather large bright yellow catkins are conspicuous in early spring.

S. c. × *myrsinifolia* = **S. latifòlia** Forb. Lvs. broad-elliptic or obovate to oblong, silky-pubescent beneath, later glabrate, turning blackish in drying; catkins on short bracted stalks; ovary silky or nearly glabrous, on pedicel of about equal length. C.S.t.44,f.1-o. F.S.t.118(c). Eu. Cult. 1829.—*S. c.* × *phylicifolia* = **S. laùrina** Sm. Brts. pubescent at first: lvs. obovate to obovate-oblong, 4–8 cm. long, short-acuminate, lustrous above, glaucescent and glabrous beneath at maturity, pubescent at first; stigma thick, usually not bifid, about as long as style. R.I.11:t.564,f.2004(c). S.E.8:t.1333(c). (*S. bicolor* Sm., not Willd.) Cult. 1809. —*S. c.* × *daphnoides* = *S. Erdingeri;* see under No. 53.—*S. c.* × *lapponum* = *S. Laestadiana;* see under No. 55.—*S. c.* × *viminalis* = *S. Smithiana;* see under No. 56.—*S. c.* × *incana* = *S. Seringeana;* see under No. 57.—*S. c.* × *purpurea* = *S. Wimmeriana;* see under No. 59.

Closely related species are: **S. grandifòlia** Ser. Lvs. to 15 cm. long, at maturity glabrous or pubescent only at midrib and closely reticulate beneath; petiole to 1 cm. long: catkins with 1–3 bracts at base, smaller, less densely villous; pedicel as long or longer than ovary; style short. R.I.11:t.578(c). H.W.2,1:117F-H. (*S. appendiculata* Vill.?) Mts. of Eu. Cult. 1871.—*S. g.* × *purpurea* = *S. austriaca;* see under No. 59.—**S. silesíaca** Willd. Lvs. lanceolate or ovate to obovate, to 14 cm. long, crenate-serrate, silky when young, later glabrate and pale green and closely reticulate beneath: pedicels as long as the usually glabrous ovary; style short. R.I.11:t.574,f.1219(c). H.W.2,1:117F-H. Mts. of Eu. and Transcauc. Cult. 1876.

29. **S. aurìta** L. Shrub to 2, rarely to 3 m.; brts. slender, tomentulose when young, later glabrous, usually dark brown; wood of 2–5-year-old brs. under the bark with short raised striations: lvs. obovate to oblanceolate, 3–8 cm. long, acute or obtusish, cuneate, obscurely serrate, dull green and rugose above and usually slightly pubescent, closely reticulate beneath and gray-tomentose at first, usually later glabrate; petiole 4–10 mm. long; stipules conspicuous, reniform, serrate: catkins sessile, staminate to 2.5, pistillate to 3 cm. long; scales brownish yellow, dark at apex; filaments villous at base; pedicels about as long as the pubescent ovary; stigmas oval, emarginate or bifid, subsessile. R.I.11:t.575(c). S.E.8:t.1330(c). H.W.2,1:116A-E. Eu., W. Asia. Long cult. Zone V.

S. a. × *cinerea* = **S. multinérvis** Doell. Brts. densely pubescent: lvs. obovate to oblong-obovate, acute, cuneate, gray-pubescent, later usually glabrate above: catkins small. C.S.1:t.30s-y. (*S. lutescens* Kern.) Eu. Cult. 1873.—*S. a.* × *repens* = **S. ambígua** Ehrh. Low shrub with often prostrate brs.; young brts. silky or silky-tomentose: lvs. elliptic or oblong to lanceolate, rather small, serrulate, silky-tomentose, later glabrescent above; stipules usually inconspicuous: catkins small; scales ovate, acute; pedicel about ¼ as long as ovary. R.I.11:t.592,f.1243b(c). S.E.8:t.1354(c). Eu. Cult. 1872.—*S. a.* × *phylicifolia* = **S. ludíficans** B. White. Brts. glabrous at maturity: lvs. elliptic to narrow-obovate, crenulate, glabrous at maturity and glaucous beneath; stipules usually persistent: catkins on bracted stalks. N. Eu. Cult. 1900.—*S. a.* × *viminalis* = *S. fruticosa;* see under No. 56.—*S. a.* × *incana* = *S. patula;* see under No. 57.—*S. a.* × *phylicifolia* × *purpurea* = *S. sesquitertia;* see under No. 59.

30. **S. cinérea** L. Gray W. Shrub to 5 m., sometimes tree-like, 1- and 2-year-old brts. and winter-buds tomentose; wood with striation as in No. 29: lvs. elliptic or obovate to obovate-lanceolate, 5–9 cm. long, acute, cuneate to rounded at base, crenate or remotely serrate, often obscurely so, tomentose at first, later glabrescent and dull green above, gray or bluish gray and densely pubescent beneath; petiole to 1 cm. long: catkins subsessile, with 4–7 bracts at base, staminate to 5, pistillate to 8 cm. long in fr.; filaments villous at base; pedicel about ⅓ as long as the pubescent or tomentose, rarely glabrate ovary; style as long as the oval emarginate stigmas. R.I.11:t.576(c). S.E.8:t.1327–9(c). H.W.2,1:116F-G. Gn.87:131. Eu. to Kamchatka and n. Persia. Long cult. Zone I or II.—Var. **trícolor** Dipp. Lvs. variegated with yellow and white.

S. c. × ? = **S. renécia** Dode. Lvs. oblong to oblong-lanceolate, 8–10 cm. long, pubescent and glaucous beneath; pedicels slender; style longer than stigmas. B.F.55:653F. Eu. Cult. 1910.—*S. c.* × *phylicifolia* = **S. Wardiàna** B. White. Young brts. pubescent: lvs. oblong-obovate or narrow-elliptic to oblong, 4–8 cm. long, glaucescent and slightly pubescent and slightly reticulate at maturity beneath; style as long as the often bifid stigmas. C.S.1:t.31s-u. Eu. Cult. 1896.—*S. c.* × *aurita* = *S. multinervis;* see under No. 29.—*S. c.* × *lapponum* = *S. Laestadiana;* see under No. 54.—*S. c.* × *viminalis* = *S. holosericea;* see under No. 56.—*S. c.* × *purpura* = *S. Pontederana;* see under No. 59.

31. **S. Medémii** Boiss. Shrub to 4 m. with stout brs.; brts. tomentose: lvs. oblong, rarely oblong-obovate, 6–15 cm. long, acute, rounded to broad-cuneate at base, crenate-serrate or irregularly and rather coarsely dentate, pubescent at first, later glabrate above, sparingly pubescent and glaucous beneath; petiole to 2 cm. long; stipules semicordate: catkins sessile, thick, staminate to 3.5 cm. long; pistillate to 9 cm. long in fr.; filaments connate about ½, hairy at base; pedicel about ½ as long as the pubescent ovary; stigmas subsessile, bifid. S.H.1:f.15h,20e-f. G.C.III.77:129. Armenia, Persia. Cult. 1880. Zone V.—Handsome willow, one of the earliest to bloom.

32. **S. rèpens** L. Creeping W. Low shrub to 1 m., with prostrate stem and ascending brs.; young brts. pubescent, later glabrous, brown: lvs. elliptic to lanceolate, 1.5–3.5, rarely to 5 cm. long, acute and recurved at apex or obtuse, entire or nearly so and revolute, silky when young, usually glabrous above at maturity, with 6–8 pairs of veins; petiole 2–3 mm. long; stipules small, only present on vigorous shoots: catkins with or shortly before the lvs. on short bracted stalks, staminate 1–1.5, pistillate to 3.5 cm. long; scales obtuse, brown at apex; pedicel about ½ or sometimes as long as the narrow-conical caps.; style very short. R.I.11:t.589(c). S.E.8:t.1356–61(c). H.W.2, 1:123. Eu. to W. and N.E. Asia. Long cult. Zone IV.—Var. **nítida** Wender. Lvs. broad-elliptic to oblong, densely silky when young, later glabrescent above. (Var. *arenaria* Anders., var. *argentea* Wimm. & Grab., var. *sericea* Gaud.) R.I.11:t.589,f.1243(c). S.E.8:t.1362(c).—Var. **angustifòlia** Gren. &

Godr. Lvs. linear to oblong-lanceolate, acute and not recurved at apex, with 8–12 pairs of veins. R.I.11:t.591,f.1242(c). S.E.8:t.1363–4(c). (Var. *rosmarinifolia* Wimm. & Grab., ? *S. rosmarinifolia* L.)

S. r. × *aurita* = *S. ambigua;* see under No. 29.—*S. r.* × *viminalis* = *S. Fricsiana;* see under No. 56.—*S. r.* × *incana* = *S. subalpina;* see under No. 57.—*S. r.* × *purpurea* = *S. Doniana;* see under No. 58.

33. **S. petiolàris** Sm. Low shrub; brts. slender, soon glabrous, purple: lvs. lanceolate or narrow-lanceolate, 4–8 cm. long, acuminate, cuneate, serrulate, slightly silky when young, soon glabrous, remaining green in drying; petiole 4–10 mm. long: catkins on short bracted stalks, with the lvs., staminate 1–2, pistillate to 4 cm. long in fr.; scales yellowish or pale brown; caps. pubescent, narrowed from an ovoid base; pedicel ⅓–½ as long as caps.; stigmas subsessile. E.B.16:t.1147(c). B.B.1:599. Gr.M.f.659. N. B. and Man., s. to Wis. and Tenn. Cult. 1802. Zone II.—Valuable basket-willow.

34. **S. serícea** Marsh. Silky W. Shrub to 4 m., with slender purplish brs. puberulous when young; lvs. lanceolate or narrow-lanceolate, 4–10 cm. long, acuminate, cuneate to rounded at base, serrulate, silky when young, later dark green and glabrous above, minutely silky beneath; petiole 4–14 mm. long; stipules narrow, deciduous: catkins sessile, before the lvs., staminate about 2, pistillate to 4 cm. long in fr.; filaments pilose at base; pedicel about ⅛ as long as the ovoid-oblong, obtuse ovary; stigma short, sessile. Gr.M.f.662. S.H.1:f.15g,21m-m′. (*S. grisea* Willd.) Me. to Mich. and Va. Cult. 1809. Zone III.—Handsome willow.

35. **S. húmilis** Marsh. Prairie W. Shrub to 2.5 m.; brts. pubescent or tomentose: lvs. oblanceolate or oblong-lanceolate, 5–10 cm. long, acute at ends, or the lower ones obovate and obtusish, sparingly denticulate and slightly revolute, dull dark green and puberulous or glabrate above, glaucous and tomentose beneath; petiole 4–6 mm. long; stipules semi-ovate, usually persistent: catkins sessile, before the lvs., ellipsoid, 1.5–4 cm. long; pedicels about ¼ or ⅓ as long as the beaked caps.; stigma sessile or on a short style. B.B.1:600. Gr.M.f.660. Nfd. to Minn. and N. C. Intr. 1876. Zone III?

A closely related species is **S. tristis** Ait. Shrub to 0.5 m.: lvs. oblanceolate or linear-oblong, 2–5 cm. long; petiole 2–3 mm. long; stipulus minute, deciduous; catkins small, subglobose to ovoid; pedicel longer than scale. B.B.1:600. Gr.M.f.661. (*S. humilis* var. *t.* Griggs.) Me. to Minn., s. to Fla. and Tenn. Intr. 1765. Zone II.

36. **S. Bebbiàna** Sarg. Beak W. Shrub or sometimes tree to 8 m.; brts. pubescent or puberulous: lvs. elliptic to oblong-lanceolate, 3–10 cm. long, acute or acuminate, rounded or narrowed at base, sparingly serrate or entire, dull green and puberulous above, reticulate and tomentose beneath, or glabrate on both sides when old, firm; petiole 4–12 mm. long; stipules semi-cordate, deciduous: catkins subsessile, bracted at base, with the lvs., staminate to 3, pistillate to 6 cm. long; scales pale, rose-tipped, thinly villous; filaments villous at base, 1 cm. long; pedicels slender, about half as long as ovary, several times longer than scale; caps. long-beaked, stigma subsessile. S.S.9: t.477. (*S. rostrata* Richards., not Thuill.) Nfd. to Alaska, s. to Pa., Ill., Utah and Calif. Intr. 1889. Zone II.—Var. **perrostràta** Schneid. Brts. glabrescent: lvs. glabrescent, smaller and often thinner. Neb. to Colo., N. Mex. and Utah. Intr. 1922.

A closely related species is **S. Geyeriàna** Anders. Shrub to 3 m.; mature brts. often bloomy: lvs. linear-oblanceolate, 2–6 cm. long, densely silky when young, sometimes becoming glabrate: catkins on very short bracted stalks; pedicel ⅓ or ¼ as long as ovary: style short, but distinct. A.I.1:506. B. C. to Ore., Mont. and Colo. Intr. 1918. Zone V.

37. **S. pedicellàris** Pursh. Bog W. Upright shrub to 1 m.; brts. glabrous, light brown: lvs. linear-oblong to elliptic-obovate, 1.5–7 cm. long, obtuse or acute, cuneate, entire and revolute, reticulate, glabrous, pale or glaucous beneath; petiole 2–4 mm. long: catkins on leafy stalks, staminate 1–2, pistillate to 3 cm. long; scales yellowish or brownish, obtuse, slightly villous; ovary conic-oblong, often reddish; pedicel slender, exceeding the scale; style short. T.N.t.120(c). B.B.1:602. (*S. myrtilloides* var. *p.* Anders., S. *myrtilloides* Tuckerm., not L.) Que. to B. C., s. to Pa., Iowa, Idaho and Wash. Intr. 1911. Zone III.

A closely related species is **S. myrtilloìdes** L. Shrub to 0.5 m., with creeping subterranean stem: lvs. orbicular-elliptic to narrow-elliptic, acute, cuneate to subcordate: staminate catkins subsessile, 1–1.5 cm. long. R.I.11:t.593,f.1244(c). H.W.2,1:124,f.209. N. Eu. to N. E. Asia. Intr. 1772. Zone II?

38. **S. pyrifòlia** Anders. Balsam W. Much-branched shrub, rarely tree, to 7 m.; brts. glabrous, lustrous, red-brown or olive: lvs. elliptic-ovate to ovate-lanceolate, 4–9 cm. long, acute or occasionally obtuse, subcordate or rounded at base, slightly crenulate-serrulate, dark green above, glaucous and reticulate beneath, thin, glabrous; petiole slender, 6–15 mm. long: catkins with the lvs., bracted at base, staminate cylindric, about 2, pistillate 5–7 cm. long in fr., rather loose; ovary glabrous, rostrate; pedicel 6–8 times as long as gland; style very short; stigmas short, thick, 2-lobed. S.S.14:t.728. B.B. 1:596. (*S. balsamifera* Barratt.) Lab. to Man., s. to Me. and Minn. Intr. 1880. Zone I.—Handsome willow, conspicuous in winter with its lustrous brs. and bright red buds.

39. **S. hypoleùca** Seemen. Shrub to 4 m.; brts. glabrous, yellow-brown: lvs. elliptic or elliptic-obovate to oblong, 2.5–5 cm. long, acute or acuminulate, cuneate to nearly rounded at base, entire or indistinctly denticulate, dark green above, glaucous beneath, glabrous; petiole 3–5 mm. long; catkins on short leafy stalks, slender, cylindric, 3–6 cm. long; axis slightly villous; scales pale, oval, obtuse, glabrous; stamens villous at base; ovary sessile, ovoid, glabrous; stigmas subsessile, elliptic, bifid. W. China. Intr. 1911. Zone V.—Graceful willow with neat foliage.

Related species are: **S. cathayàna** Diels. Shrub to 4 m.; young brts. pubescent: lvs. oblong or narrow-elliptic, obtuse or acutish, entire or minutely glandular-denticulate, glaucescent and slightly pubescent on midrib beneath or silky all over: scales ciliate; style short, but distinct. W. China. Intr. 1909. Zone V?—**S. macroblàsta** Schneid. Shrub to 6 m.; brts. yellowish or yellowish brown, pubescent; winter-buds oblong, twice as long as petioles: lvs. narrow-lanceolate, 1.5–3 cm. long, acute, rounded or subcordate at base, glaucous beneath, glabrous; fruiting catkins 2.5–3 cm. long; ovary glabrous, with very short style and short emarginate stigmas. W. China. Intr. 1911. Zone V?

40. **S. heterochròma** Schneid. Shrub or tree to 15 m.; brts. glabrous or slightly pubescent at first, later yellow- to purple-brown: lvs. elliptic-ovate or elliptic to oblong-lanceolate, 5–10 cm. long, acuminate, cuneate, entire, dark green above, glaucous beneath and silky at first, soon glabrous or sometimes remaining silky; petiole 5–15 mm. long; stipules minute or wanting: catkins on short bracted stalks, with or shortly before the lvs., staminate 3–5.5, pistillate in fr. 6–10 cm. long; scales oblong, very villous, light yellow-brown; caps. gray-pubescent, 5 mm. long; pedicel about 4 times as long as gland; style about ⅓ as long as caps., with narrow-oblong bifid stigmas. (*S. Henryi* Burk.) C. China. Intr. 1908. Zone V?

41. **S. càndida** Fluegge. Hoary W. Shrub to 2 m.; brts. white-woolly, older red: lvs. oblong-lanceolate to linear-lanceolate, 4–12 cm. long, acute at ends, slightly revolute and denticulate or entire, dull and pubescent or

finally glabrate above, white-tomentose beneath; petiole 3–5 mm. long; stipules lanceolate, deciduous: catkins sessile, with the lvs., cylindric, densely villous, staminate about 2.5, pistillate 3–5 cm. long in fr.; ovary conic-ovoid, pubescent; pedicels as long or longer than gland; stigmas short, spreading. Torrey, Fl. N. Y. t.117(c, as *S. incana*). F.Sa.t.91(c). Gr.M.f.665. Nfd. and Lab. to Athabasca, s. to N. J., Iowa and Mont. Cult. 1809. Zone I.—Very distinct willow on account of its white-woolly tomentum.

42. **S. myrsinifòlia** Salisb. Shrub to 4 m., rarely tree-like, with spreading brs.; young brts. densely pubescent, tardily glabrescent, rarely glabrous: lvs. orbicular-ovate or elliptic to oblong-lanceolate, 2–10 cm. long, acute or acuminate, rounded or sometimes subcordate to cuneate at base, irregularly- or undulate-serrate, dark green and glabrous or nearly so above, glabrous or pubescent, rarely tomentose beneath and gray-green or bluish gray, turning black in drying; petiole 1–2 cm. long; stipules reniform or oblique-ovate; catkins shortly before or with the lvs., on short leafy stalks, staminate to 2.5 cm. long, oval to oblong, pistillate to 6 cm. long; scales dark-colored at apex, villous; filaments villous at base; pedicel ½–⅔ as long as the glabrous, rarely pubescent ovary, nearly twice as long as gland; style ¼–⅔ as long as ovary; stigmas oblong. R.I.11:t.573(c). S.E.8:t.1347,1351–4(c). H.W.2, 1:119. (*S. nigricans* Sm., *S. Andersoniana* Sm., *S. phylicifolia* Willd., not L., ? *S. spadicea* Vill.) Eu. to W. Asia and W. Siberia. Long cult. Zone IV.—An extremely variable species of which numerous varieties have been described, but neither of horticultural nor economic importance.

S. m. × *hastata* = **S. Mielichhòferi** Saut. Small shrub; young brts. silky-pubescent, rarely glabrous: lvs. elliptic to lanceolate, inequally and closely serrate, near base and petiole pubescent, later glabrous, dark lustrous green above, lighter beneath; petiole 5–10 mm. long: pedicel ½ as long as the glabrous ovary. C.S.2: t.42g-k. S.H.1:f.19q,20c-d. Eu. Cult. 1888.—*S. m.* × *retusa* = *S. Cottetii;* see under No. 19.—*S. m.* × *caprea* = *S. latifolia;* see under No. 28.—*S. m.* × *phylicifolia* = *S. tetrapla;* see under No. 43.

43. **S. phylicifòlia** L. Upright shrub to 1, rarely 3 m.; brts. glabrous or pubescent when very young, later dark brown and lustrous: lvs. elliptic or obovate to lanceolate, 2–8 cm. long, acute or short-acuminate, rounded or cuneate at base, serrate or crenate-serrate, lustrous above, glaucous or gray-green beneath, glabrous or slightly pubescent at first, subcoriaceous, not blackening in drying; petiole 8–10 mm. long; stipules semi-cordate, rarely present: catkins on short bracted stalks, before or with the lvs., staminate to 2.5, pistillate to 6 cm. long in fr.; scales oblong to obovate, acutish, dark except at base; filaments glabrous; pedicel 3–4 times as long as gland; caps. pubescent, rarely glabrous, 7–10 mm. long. R.I.11:t.563.f.2002(c). S.E.8:t. 1335–6,1340,1345(c). F.Sa.t.38,44,46,47(c). (*S. bicolor* Ehrh., *S. Weigeliana* Willd.) Eu. to N. E. Asia. Cult. 1809. Zone III?

S. p. × *myrsinifolia* = **S. tetrápla** Walker. Lvs. more or less pubescent when young; blackening in drying; foliaceous stipules usually present: filaments villous at base; ovaries often only partially pubescent. S.E.8:t.1337,1341–4,1348–50(c). Eu. Cult. 1829.—*S. p.* × *aurita* = *S. ludificans* White; see under No. 29.—*S. p.* × *cinerea* = *S. laurina;* see under No. 30.—*S. p.* × *aurita* × *purpurea* = *S. sesquitertia;* see under No. 59.

Closely related species are: **S. formòsa** Willd. Dense procumbent or upright shrub, to 0.5, rarely to 1 m.; brts. and lvs. glabrous or slightly pubescent at first, the latter 1–5 cm. long, serrate or entire; scales pale, darker at apex; pedicel much shorter than the narrow gland; anthers red or reddish at first. R.I.11:t. 561(c). S.E.8:t.1371–4(c). H.W.2,1:120. (*S. arbuscula* L., in part, *S. prunifolia* Sm.) Eu. to Cauc. and Siberia. Cult. ? Zone V.—*S. f.* × *herbacea* = *S. simulatrix;* see under No. 18.—**S. planifòlia** Pursh. Shrub to 3 m.; brts. purplish, sometimes bloomy: lvs. elliptic to lanceolate or oblong-obovate, 2–5 cm. long, entire or

indistinctly denticulate, glaucous beneath, glabrous; catkins smaller; pedicels as long or slightly exceeding the gland; caps. 5–6 mm. long. B.B.1:600. Gr.M.668. (*S. chlorophylla* Anders., *S. phylicifolia* Tuckerm., not L.) Lab. to Alb., s. to N. H., Vt., Colo. and Calif. Cult. 1816. Zone I.

44. **S. subcoerúlea** Piper. Shrub to 2 m.; brts. glabrous or slightly pubescent at first, later purple and sometimes bloomy: lvs. lanceolate to oblanceolate, 3–6 cm. long, acute or short-acuminate, cuneate or rounded at base, entire or indistinctly crenulate, glabrous above, with lustrous, white silky tomentum beneath, with conspicuous yellow glabrescent midrib, of firm texture; petiole 2–7 mm. long; catkins subsessile, staminate 2–3.5, pistillate 2.5–5 cm. long in fr.; pedicels about half as long as gland; caps. 5 mm. long. A.I.1:502. (*S. pellita* Anders., in part.) Wash. to Wyo., Colo., N. Mex., Utah and Calif. Cult. 1890. Zone V.—Handsome willow, conspicuous in winter on account of its often bloomy brs.

Closely related species are: **S. pellita** Anders. Brts. bloomy: lvs. lanceolate or oblanceolate to linear-lanceolate, 4–12 cm. long, white silky-villous beneath, later glabrescent; catkins longer; pedicel longer than gland. B.B.1:598. Gr.M.f.667. Nfd. to Lake Winnipeg, s. to Me., Vt. and Mich. Intr. 1918.—Handsome willow. —**S. Drummondiàna** Barratt. Brts. tomentulose, not bloomy; lvs. obovate or obovate-oblong to elliptic-oblanceolate, 3–8 cm. long, obtuse or acute, velutinous-tomentose beneath; pedicel longer than gland. A.I.1:503. B. C., Alb. Intr. 1921.

45. **S. adenophýlla** Hook. Furry W. Straggling shrub to 2.5 m.; brts. silky-villous: lvs. ovate to ovate-lanceolate, 3–6 cm. long, short-acuminate, cordate or rounded at base, glandular-serrulate, densely silky-villous on both sides, green beneath; petiole 3–6 mm. long, dilated at base, shorter than the cordate-ovate, persistent stipules: catkins on short leafy stalks, cylindric, staminate about 2, pistillate 4–10 cm. long in fr.; scales light brown, obtuse, scarcely darkened at apex; ovary glabrous, conic-ovoid; pedicel about as long as gland, shorter than scale; style longer than stigma. B.B.1:597. (*S. syrticola* Fern.) Lab. to Wisc., s. to Pa. and Ill. Cult. 1900. Zone I or II?—Handsome and distinct willow.

46. **S. glaucophylloïdes** Fern. Shrub or shrubby tree to 5 m.; brts. glabrous: lvs. ovate or obovate to oblong-lanceolate, 5–12 cm. long, short-acuminate, rounded or cuneate at base, glandular-serrulate, dark green above, glaucous beneath, glabrous, subcoriaceous at maturity; petiole 3–10 mm. long; stipules large, persistent; catkins cylindric, on leafy stalks, very silky, staminate 3–5, pistillate, 4–7 cm. long in fr.; scales obtuse; pedicel about as long as scale; caps. rostrate, 9–11 mm. long, glabrous. B.B.1:596. Gr.M.f.652. (*S. glaucophylla* Robins. & Fern., not Schleich. et al.) N. B. to Que. and Me.—Var. **glaucophýlla** Schneid. Lvs. firmer, thicker; pedicels longer, exceeding the scale; style longer. (*S. glaucophylla* Bebb, not Schleich. et al.) Ont. to Ohio, Ill. and Wisc. Intr. 1894. Zone V or IV?

Closely related species are: **S. montícola** Bebb. Shrub to 7 m.: lvs. elliptic to ovate or obovate, 3–5 cm. long; catkins subsessile, in fr. to 4.5 cm. long; caps. 5–7 mm. long. (*S. padophylla* Rydb.) Mont. to Colo., N. Mex. and Utah. Intr. 1898. Zone V.—**S. Barclaÿi** Anders. Shrub; brts. villous: lvs. elliptic-oblong to oblong, usually cuneate, glandular-denticulate, villous above at first, glaucous and glabrous beneath: catkins on leafy stalks; scales mostly acute; caps. 5–8 mm. long, sometimes slightly silky. A.I.1:498. B. C. to Ore. and Mont. Intr. 1919. Zone V.

47. **S. hastàta** L. Halberd-leaved W. Much-branched shrub to 1.5 m.; young brts. pubescent, soon glabrous, red-brown the 2d year: lvs. very variable, elliptic to ovate or obovate, 2–8 cm. long, rounded to cuneate, or on vigorous shoots cordate at base, irregularly serrulate, dull green above, glaucous and glabrous beneath or slightly pubescent when young, of firm texture; petiole 3–8 mm. long: stipules usually large, semicordate: catkins

on leafy stalks, with the lvs., staminate to 3.5, pistillate to 5 cm. long; scales with long villous hairs; filaments glabrous; pedicel 2–4 times as long as gland; style as long or slightly longer than stigma. R.I.11:t.570(c). H.W.2,1:121. Mitt. Thuering. Bot. Ver.29:10(h). Mts. of C. and S. Eu. to N. E. Asia and Kashmir. Intr. 1780. Zone V.

S. h. × *myrsinifolia* = *S. Mielichhoferi;* see under No. 42.

A closely related species is **S. glâbra** Scop. Brts. and lvs. quite glabrous, the latter broad-elliptic or ovate to oblong, crenulate; scales long-ciliate, otherwise glabrous; filaments villous near base. R.I.11:t.568(c). H.W.2,1:121. Alps and mts. of S. E. Eu. Cult. 1870. Zone V.—Other related species are: **S. japónica** Thunb. Lvs. elliptic-oblong, 5–12 cm. long, acuminate, cuneate, sharply serrate with glandular teeth, those of peduncle entire, silky-pubescent when young, soon glabrous: catkins with the lvs., thin and slender, to 10 cm. long; filaments villous at base; pedicel longer than gland. Seemen, Sal. Jap.t.7. S.H.1:f.20z,23b. Jap. Cult. 1874. Zone V?—**S. pyrolaefôlia** Ledeb. Shrub or small tree to 5 cm.; brts. pubescent when young: lvs. oblong-elliptic, 3–7 cm. long, or on vigorous shoots orbicular-elliptic, acute, serrate, bluish gray beneath, soon glabrous; petiole 1.5–2 cm. long; stipules large, suborbicular: catkins before the lvs., short-stalked, to 5 cm. long; pedicel 2–3 times as long as gland. S.H.1:f.20z′,23n. Ledebour, Ic. Pl. Ross.t.476. N. E. Asia. Intr. about 1900.

48. **S. cordàta** Muhlenb. Shrub to 4 m.; brts. glabrous or puberulous at first: lvs. oblong-lanceolate to lanceolate, 5–14 cm. long, acuminate, rounded to subcordate or often cuneate on flowering brts., sharply serrulate, dull green above, green or paler beneath, glabrous or slightly pubescent beneath; petiole 5–15 mm. long; stipules reniform or ovate, usually large: catkins on short bracted stalks before the lvs., rather slender, staminate 2–5, pistillate 2.5–6 cm. long in fr.; caps. 4–7 mm. long, its pedicel ¼–⅓ as long; style 0.5–0.8 mm. long. B.B.1:596. Gr.M.f.650. (*S. rigida* Muhlenb.) N. B. to B. C., s. to Va., Mo., Colo. and Calif. Intr. 1812. Zone III.—Var. **purpurâscens** Schneid. Lvs. purple when young. (*S. Nicholsonii* f. *p.* Dieck.) Orig. before 1889.—Staminate catkins conspicuous.

S. c. × *sericea* = **S. myricoïdes** Muhlenb. Brts. pubescent: lvs. lanceolate, cuneate, glaucous or glaucescent beneath and glabrate or more or less silky beneath; stipules small: caps. often silky when young. (*S. cordata* var. *m.* Carey.) Mass. to Wisc. and Kans. Cult. 1880.

A closely related species is **S. missouriénsis** Bebb. Large shrub or tree to 15 m.; brts. pubescent: lvs. lanceolate to ovate-oblong, rarely obovate, 8–15 cm. long, glaucous beneath: fruiting catkins 6–10 cm. long; caps. 8–10 mm. long. S.S.9:t.480. B.T.193. H.H.90,91(b). Ky. to Mo., Iowa and Neb. Intr. 1898. Zone V.—Another related species is **S. myrtillifôlia** Anders. Shrub to 0.5 m.: lvs. elliptic to oblanceolate, 1–5 cm. long, acutish to obtuse, crenate-serrate, green on both sides, glabrous; petiole 2–4 mm. long: catkins on short leafy stalks, 1–3 cm. long; style very short. (*S. pseudomyrsinites* Anders., in part.) Proc. Wash. Acad. Sci. 3:325. Alaska to Alb. Intr. 1922. Zone V.

49. **S. irrorâta** Anders. Upright shrub to 3 m.; brts. glabrous, purple, rarely yellowish, bloomy: lvs. oblong to linear-lanceolate, 6–10 cm. long, acuminate, cuneate, bright green and lustrous above, glaucous beneath, remotely serrate or entire, glabrous, firm; petiole 3–10 mm. long, usually yellow: catkins subsessile, usually naked at base, short and dense, 1.5–2.5 cm. long; scales dark, densely white-villous; pedicel about 0.5 mm. long; style rather short; stigmas short and thick. Colo. to N. Mex., Ariz. Intr. 1898. Zone V.—Handsome distinct species, conspicuous in winter on account of its bloomy brs.

50. **S. myrsinîtes** L. Shrub to 0.4 m., with short densely leafy brs., pubescent when young, later glabrous, dark brown and lustrous: lvs. short-petioled, elliptic or obovate to lanceolate, 1–5 cm. long, acute at ends, rarely obtuse, serrate with usually glandular teeth, pubescent at first, later glabrous and lustrous green on both sides; stipules little developed: catkins on leafy

stalks, dense, staminate to 4, pistillate to 5 cm. long; scales purple, darker at apex; anthers purple; ovary short-stalked, pubescent, later glabrescent; style ⅕–½ as long as ovary, purple, with narrow stigmas. R.I.11:t.559,f.1188–90(c). S.E.8:t.1375–6(c). H.W.2,1:124. (*S. m.* var. *serrata* Neilr.) Mts. of Eu., N. Asia to Kamtchatka. Cult. 1789. Zone V or IV?—Var. **Jacquiniàna** W. Koch. Lvs. entire or sparingly serrulate. R.I.11:t.559,f.1191(c). (*S. J.* Willd.)

51. **S. lanàta** L. Shrub to 1.5 m.; young brts. and winter-buds woolly: lvs. elliptic-orbicular to oblong-obovate, 2.5–7 cm. long, acute, broad-cuneate to subcordate at base, entire, sometimes undulate, silky-villous above when young, later glabrescent and dull green, glaucous and reticulate beneath and clothed with long silky hairs; petiole 5–15 mm. long; stipules often large, entire: catkins with the lvs., densely yellowish silky, staminate ovoid-oblong, subsessile, about 5 cm., pistillate 4–6, in fr. to 8 cm. long, short-stalked; scales dark brown; filaments glabrous; ovary glabrous, subsessile or the lower short-stalked; gland linear; style about ⅓ as long as the glabrous ovary, with narrow bifid stigmas. S.E.8:t.1267 (c, excl. stamens). S.H.1:f.21a-b,25l. C.S.2:t.36a-e. N. Eu. and N. Asia. Cult. 1789. Zone III?—Handsome and striking willow on account of its long silky pubescence.

52. **S. Hookeriàna** Barratt. Shrub, sometimes with prostrate brs., or tree to 10 m.; young brts. densely tomentose: lvs. oblong to oblong-obovate, 5–16 cm. long, usually acute, entire or crenate-serrate, glaucous and pubescent or tomentose beneath; petiole 5–15 mm. long, pubescent; stipules wanting or small: catkins subsessile, with few bracts at base, 3–5, the pistillate in fr. to 8 or 12 cm. long; ovary glabrous, sometimes tomentose; pedicel 2–3 times as long as gland; stigmas short, spreading, emarginate. S.S.9:t.485. S.H.1:26g,27n-o. A.I.1:500. B. C. to Ore. Cult. 1891. Zone V.

A related species is **S. Piperi** Bebb. Shrub to 6 m.; brts. slightly villous, soon glabrous: lvs. similar to those of the preceding species: filaments hairy at base; caps. slightly hairy at apex. A.I.1:499. Wash. to Ore. Intr. 1898. Zone V.

53. **S. daphnoìdes** Vill. Large shrub or tree to 10 m.; brts. slender, yellowish or brown, bloomy, sometimes slightly pubescent when young: lvs. oblong-lanceolate to narrow-lanceolate, 5–10 cm. long, acuminate, finely glandular-serrulate or nearly entire, pubescent when young, soon glabrous, dark lustrous green above, glaucous beneath, of firm texture; petiole 2–4 mm. long; stipules semicordate, large: catkins cylindric, about 3 cm. long, densely silky; scales oblong-obovate, dark brown; filaments glabrous; ovary conic-ovoid, glabrous, short-stalked; gland linear; style nearly half as long as ovary; stigmas linear-oblong, entire. R.I.11:t.602(c). F.Sa.t.26(c). H.W.2,1:110. Eu. to C. Asia and Himal. Cult. 1829. Zone IV.—Handsome willow, conspicuous in winter.

S. d. × *caprea* = **S. Erdíngeri** Kern. Young brts. pubescent: lvs. obovate to oblong, acuminate, silky when young, later glabrous and lustrous above, gray-green and glabrate beneath; pedicel about ½ as long as the silky ovary; style about ¼ as long as ovary; stigma upright. C.S.2:t.46a-c. (*S. cremensis* A. & J. Kern., *S. Figerti* A. & G. Camus.) Eu. Cult. 1872.—*S. d.* × *incana* = *S. Reuteri;* see under No. 57.

A closely related species is **S. acutifòlia** Willd. Less tall; brs. slenderer, violet- or red-brown, bloomy: lvs. lanceolate to linear-lanceolate, 6–12 cm. long, long-acuminate, cuneate; stipules lanceolate: catkins slenderer, remote; style shorter; stigmas emarginate. R.I.11:t.603(c). S.E.8:t.1366(c). H.W.2:t.29,f.6–9(c). (*S. daphnoides* var. *a.* Doell.) Russia to E. Asia. Cult. 1809. Zone IV.—Planted for ornament like No. 53; brs. used for coarse basket-work.

54. **S. Rehderiàna** Schneid. Shrub or tree to 9 m.; young brts. sparingly villous or glabrous, later red-brown: lvs. lanceolate, 5–12 cm. long, short-

acuminate, rounded to broad-cuneate at base, irregularly glandular-crenulate, rarely nearly entire, grayish white and silky beneath or sometimes glabrescent and glaucous; petiole 2–8 mm. long, usually puberulous: catkins sessile or subsessile, with 2–3 bracts at base, 2–3 cm. long; scales oblong, obtuse, sparingly silky-villous; filaments glabrous or pilose at base; anthers purple at first; ovary glabrous or sparingly silky-villous, subsessile; style about ½ as long as ovary, with short emarginate stigmas. W. China. Intr. 1908. Zone V.

55. **S. lappònum** L. Dense much-branched shrub to 1.5 m.; brts. pubescent, later glabrous, dark brown and lustrous; winter-buds pubescent: lvs. elliptic-oblong to obovate-oblong or lanceolate, 2.5–6 cm. long, acute or acuminate, rounded to cuneate at base, entire, soft-pubescent and dull green above, gray- or white-tomentose beneath; petiole to 1 cm. long; stipules wanting or minute: catkins subsessile with few small bracts, staminate about 2.5 cm. long, pistillate 2.5–5 cm. long; scales oblong, obtuse or acutish, silky-villous; filaments glabrous; anthers yellow or reddish; ovary densely pubescent, subsessile or the lower ones short-stalked; gland linear; style slender, longer than the narrow, usually divided stigmas. S.E.8:t.1368–9(c). F.Sa.t. 70,72,73(c). M.G.25:140(h). Mts. of Eu. to the Altai. Cult. 1789. Zone III?

S. l. × *caprea* = **S. Laestadiàna** Hartm. Young brts. hoary-pubescent: lvs. obovate-oblong to elliptic-lanceolate, acute at ends, silky-pubescent beneath: pedicel slightly longer than gland; style short, about as long as stigmas. C.S.2:t. 38m-p. Eu. Cult. 1873.

A closely related species is **S. helvètica** Vill. Low shrub, to 0.6 m.: lvs. oblong to elliptic-lanceolate, entire, slightly pubescent or glabrous above, white-tomentose beneath: catkins on leafy stalks with the lvs. R.I.11:t.572,f.1216(c). H.W.2,1:122. (*S. lapponum* var. *h.* Anders.) Alps. Cult. 1872. Zone V.

56. **S. viminàlis** L. Common Osier. Upright shrub or tree to 5 or occasionally 10 m.; young brts. densely pubescent, later glabrescent; winter-buds pubescent: lvs. linear-lanceolate to lanceolate, 10–25 cm. long, broadest below the middle, acuminate, cuneate, nearly entire or obscurely crenate, undulate, dull green and glabrate above, grayish white and silky-tomentose beneath; petiole 4–12 mm. long; stipules small, lanceolate, deciduous: catkins subsessile, dense, staminate 2–4, pistillate about 2.5 and in fr. 3–6 cm. long; stamens long, glabrous; ovary conic-ovoid, pubescent; pedicel much shorter than the linear gland; style nearly as long as ovary, with narrow stigmas. R.I.11:t.597(c). S.E.8:t.t.1322(c). H.W.2,1:112,t.31(c). Eu. to N. E. Asia and Himal.; occasionally naturalized in the E. States. Long cult. as basket willow. Zone III?—Var. **Gmelìni** Anders. Young brts. pubescent or glabrescent: lvs. equally narrowed at both ends, slightly pubescent above : catkins short-stalked; ovary always sessile; style shorter than the slender stigmas. (*S. splendens* Ledeb.) Russia, W. Siberia. Cult. 1905.—One of the best basket willows; also planted for ornament.

S. v. × *caprea* = **S. Smithiàna** Willd. Tall shrub to 6 m.; brts. later glabrescent: lvs. oblong-lanceolate or ovate-lanceolate, 6–12 cm. long, soon glabrate above, grayish and soft-pubescent beneath; stipules large: catkins about 2.5 cm. long; pedicel finally as long or longer than gland; style as long as stigmas. F.Sa.t. 134(c). C.S.1:t.29a-f. (*S. mollissima* Sm., not Ehrh.) Cult. 1829.—*S. v.* × *aurita* = **S. fruticòsa** Doell. Shrub to 3 m.; brts. soon glabrous: lvs. lanceolate or oblong-lanceolate, 3–10 cm. long, crenate-serrate, slightly wrinkled above, reticulate and pubescent or glabrescent beneath; pedicels about as long as gland; style as long as stigmas. F.Sa.t.128(c). Eu. Cult. 1829.—*S. v.* × *cinerea* = **S. holoserícea** Willd. Shrub to 4 m.; brts. persistently pubescent; wood under bark with short raised striations: lvs. oblong-ovate to lanceolate or oblanceolate, 5–12 cm. long, crenulate, dull green and pubescent above, light gray and silky-pubescent beneath; stipules ovate-lanceolate, subentire: catkins about 3 cm. long; pedicel

finally as long as gland; style about as long as stigmas. S.E.8:t.1324(c). F.Sa.t. 128(c). C.S.1:t.29m-r. Eu. Cult. 1829.—*S. v.* × *repens* = **S. Friesiàna** Anders. Lvs. lanceolate to narrow lanceolate, 2–7 cm. long, entire, sometimes revolute, densely silky when young, later glabrate above; catkins sessile or subsessile; style about ¼ as long as ovary; stigmas linear, bifid. F.Sa.t.87(c). Andersson, Mon. Sal.t.6,f.66. (*S. rosmarinifolia* L., in part?) Eu. Cult. 1829.—*S. v.* × *alba* = *S. mollissima;* see under No. 5.—*S. v.* × *purpurea* = *S. rubra* Huds.; see under No. 58.

Closely related species or possibly hybrids with species of the Caprea group, but differing from the 3 hybrids described above by the subsessile or sessile ovaries, are the following: **S. stipulàris** Sm. Large shrub, similar to No. 56, but lvs. broader with foliaceous stipules longer than petioles; brts. densely woolly; lvs. narrow-lanceolate, 12–20 cm. long: catkins about 3 cm. long; stigmas linear, undivided, as long or longer than style. F.Sa.t.132(c). R.I.11:t.598(c). S.E.8:1323(c). Eu. Cult. 1829.—**S. dasýclados** Wimm. Tall shrub or tree to 6 m.; brts. densely woolly: lvs. oblong-lanceolate or lanceolate to obovate-lanceolate, to 20 cm. long, acuminate, dull green above and slightly pubescent, soft-pubescent and glaucescent beneath; stipules large, ovate-lanceolate: catkins large, staminate to 4.5, pistillate to 5.5 cm. long; stigmas thick, undivided, about as long as style. F.Sa.t.131 (c). S.E.8:t.1326(c). (*S. acuminata* Sm., not Mill., nor Pall.) Eu. Cult. 1829.—Another related species is **S. opâca** Anders. Tree to 10 m.; brts. slightly pubescent at first, soon glabrous, brown: lvs. lanceolate to narrow-lanceolate, to 15 cm. long, crenulate, glaucous beneath, with prominent yellow midrib, glabrous or sometimes pubescent on veins; stipules small, ovate-lanceolate or wanting: catkins about 3 cm. long; ovary gray-pubescent, short-stalked or sometimes as long as the linear gland; stigma bifid, shorter than the slender style. Seemen, Sal. Jap. t.10a-f. N. E. Asia, Jap. Intr. 1905. Zone V.

57. **S. incàna** Schrank. Shrub or sometimes tree to 15 m., with slender brs. gray-pubescent when young: lvs. linear to narrow-lanceolate, 5–15 cm. long, acute at ends, revolute and finely serrate toward the apex, densely tomentose when young, later glabrous and dark green above, white-tomentose beneath; petiole 4–8 mm. long; stipules usually wanting: catkins on short bracted stalks, about 3 cm. long; scales oval, truncate or slightly emarginate, pale; filaments connate at base or ½; ovary glabrous, short-stalked; style about ⅓ as long as ovary; stigmas linear-oblong, cleft. R.I.11:t.596(c). H.W.2,1:109. Gs.4:48. (*S. Elaeagnos* Scop.) Mts. of C. and S. Eu. and Asia Minor. Cult. Zone V.—Handsome and distinct with grayish feathery foliage turning yellow in autumn.

S. i. × *caprea* = **S. Seringeàna** Gaud. Brts. tomentose: lvs. lanceolate or oblong-oblanceolate, revolute and irregularly serrulate, finally glabrous above, gray-tomentulose beneath: catkins before the lvs., stamens connate and villous at base; pedicel about ½ as long as ovary; style short. R.I.11:t.580(c). C.S.1:t. 28h-l. (*S. salviaefolia* Link, *S. Flueggeana* Willd., in part, *S. oleifolia* Vill., in part.) Eu. Cult. 1872.—*S. i.* × *aurita* = **S. pâtula** Ser. Brts. gray-pubescent: lvs. oblong to lanceolate, acute at ends, at maturity slightly pubescent above, gray-tomentulose beneath; catkins cylindric, on bracted stalks; filaments connate and villous at base; pedicel about ½ as long as ovary; stigmas oblong, somewhat shorter than style. F.Sa.t.96(c). C.S.1:t.28n-p. (*S. pallida* Forb., *S. oleifolia* Vill., in part.) Eu. Cult. 1829.—*S. i.* × *repens* = **S. subalpìna** Forb. Lvs. lanceolate, entire or remotely serrulate, silky-tomentose beneath: catkins oblong to cylindric; stamens connate at base; style about ¼ as long as ovary. C.S.1:t.28q-t. Andersson, Monog. Sal.t.6,f.68. Alps. Cult. 1829.—*S. i.* × *daphnoides* = **S. Reùteri** Moritzi. Often tree-like; young brts. gray-pubescent, often bloomy when older: lvs. lanceolate or narrow-lanceolate, silky-tomentose beneath; stipules small, lanceolate; catkins subsessile; scales dark brown above the middle: filaments slightly connate at base. C.S.1:t.27r-x. Eu. Cult. 1870.

58. **S. Miyabeàna** Seemen. Shrub or small tree to 5 m.; brts. light brown, glabrous: lvs. lanceolate to narrow-lanceolate, 5–15 cm. long, acute at ends, crenate-serrate, glaucous beneath, glabrous; petiole 3–10 mm. long; stipules lanceolate, about as long as petiole: catkins before or with the lvs., cylindric, staminate 3–5.5 cm. long, sessile, pistillate 4–8 cm. long in fr. and rather lax, on short leafy-bracted stalks; scales oval, dark brown, villous; filaments

wholly united; anthers yellow; ovary ovoid, sessile, tomentose; stigmas short, undivided, sessile. Miyabe & Kudo, Ic. Ess. For. Hokk. t.19(c). Seemen, Sal. Jap.t.12a-e. Japan. Intr. 1897. Zone V.—Handsome small tree.

A related species is **S. Pierôtii** Miq. Shrub: brts. glabrous, brown: lvs. lanceolate, 7–15 cm. long, broadest below the middle, serrulate, glaucous beneath, pubescent at first, soon glabrous: catkins smaller; style about ½ as long as ovary. Seemen, Sal. Jap. t.13e-f. S.H.1:f.23a,27l-m. (*S. japonica* Dipp., not Thunb.) Amurl., Japan. Cult. 1893. Zone V?

59. **S. purpúrea** L. Purple Osier. Shrub to 3 m., with slender tough brs., purplish at first, later gray or olive-gray, glabrous: lvs. oblanceolate, rarely oblong-obovate, often opposite, 5–10 cm. long, acute or acuminate, cuneate, serrulate toward the apex, dull green above, pale or glaucous beneath, glabrous or slightly pubescent at first, turning black in drying; petiole 4–8 mm. long; stipules small or wanting: catkins subsessile, usually curved, before the lvs., slender, staminate 1.5–2.5, pistillate to 2 cm. long; scales obovate, obtuse, villous, dark above the middle; filaments wholly connate; anthers reddish; ovary ovoid, sessile or subsessile, tomentose; stigmas thick, usually entire, sessile or subsessile. R.I.11:t.582(c). S.E.8:t.1316,1319(c). H.W.2:t.30(c). Eu. and N. Afr. to C. Asia and Jap. Long cult. Zone IV.—Var. **péndula** Dipp. Brts. very slender, pendulous. (Var. *scharfenbergensis* Bolle, *S. nigra pendula* and *S. americana pendula* Hort.)—Var. **grácilis** Gren. & Godr. A slender-branched, narrow-lvd. form. (Var. *uralensis* Hort.)—Var. **Lambertiàna** W. D. Koch. Brs. purplish, stouter: lvs. obovate, oblong. R.I.11:t.585(c). S.E.8:t.1318(c). (*S. L.* Sm.)—Var. **serícea** W. D. Koch. Young brts. and lvs. beneath silky-tomentose at first, becoming glabrous.—Var. **amplexicaûlis** Boiss. Lvs. always opposite, subsessile, oblong to oblong-lanceolate, acutish, rounded to subcordate at base. S. E. Eu. and W. Asia.—Var. **multinérvis** Matsum. Similar to the preceding var., but lvs. broader, narrow-elliptic to oblong, up to 2.5 cm. broad, usually obtuse. S.I.2:t.8,f.7(c). Seemen, Sal. Jap.t.11f-k. (*S. Savatieri* Camus.) Japan. Intr. ?—Handsome and graceful willow, often planted for ornament; also much grown for the finer sorts of basket-work.

S. p. × *caprea* = **S. Wimmeriàna** Gren. & Godr. Young brts. sparingly gray-pubescent, later glabrous, lustrous: lvs. oblong to oblong-lanceolate or lanceolate, irregularly serrulate, thinly silky at first, becoming glabrous, dark green above, grayish or glaucescent beneath: catkins subsessile; filaments connate at base and slightly villous; pedicel about ½ as long as ovary; stigmas oblong, emarginate, subsessile. Host, Sal. t.60,61(c, as *S. discolor*). Eu. Cult. 1872.—*S. p.* × *grandifòlia* = **S. austríaca** Host. Lvs. lanceolate or oblong-oblanceolate, serrulate, glabrous except when young: filaments partly connate, villous at base; anthers reddish at first; pedicel ½ as long as ovary; style very short. Host, Sal. t.64,65(c). (*S. neriifolia* Schleich., *S. Pontederana* Parl., not Willd.) Eu. Cult. 1870.—*S.p.* × *aurita* × *phylicifolia* = **S. sesquitértia** B. White. Shrub to 2 m., with slender brs. pubescent when young: lvs. oblong-obovate, crenate-serrate, rugulose above, glaucous beneath, soon glabrous: catkins usually androgynous; filaments connate; ovaries short-stalked; style distinct. Eu. Cult. 1900.—*S. p.* × *cinerea* = **S. Pontederàna** Willd. Brts. becoming glabrous: lvs. obovate-lanceolate to lanceolate, at maturity glabrous or nearly so above, silky and glaucous beneath: filaments usually connate ½; anthers reddish at first; style short. R.I.11:t.587(c). F.Sa. t.43(c). (*S. sordida* Kern.) Eu. Cult. 1829.—*S. p.* × *repens* = **S. Doniàna** Sm. Young brts. thinly pubescent, soon glabrous: lvs. oblong to lanceolate, serrulate toward the apex, minutely silky when young, later glabrous above, glaucous and glabrescent beneath: catkins oblong; filaments more or less connate; anthers red; pedicel ¼ as long as ovary; stigmas subsessile, oval, emarginate. S.E.8: t.1365(c). F.Sa.85(c). (*S. parviflora* Host.) Eu. Cult. 1829.—*S. p.* × *viminalis* = **S. rúbra** Huds. Shrub to 3 m., with long brs. pubescent at first, later glabrous and yellow: lvs. lanceolate to oblanceolate, 6–14 cm. long, acuminate, glaucescent and glabrescent beneath or sometimes pubescent: catkins 2–3 cm. long; filaments

more or less connate; anthers reddish at first; style distinct. R.I.11:t.586(c). S.E.8:t.1320(c). F.Sa.t.6(c). (*S. Helix* L.?) Eu. Long cult.; brs. used for basket-work.— *S. p.* × *pentandra* = *S. heterandra* Dode; see under No. 2.

Related species are: **S. Wilhelmsiàna** Bieb. Shrub with slender brs.: lvs. linear, 1.5–4 cm. long, not more than 4 mm. broad, remotely denticulate or entire, silky on both sides when young, later glabrescent: catkins on leafy stalks, thin; scales pale, villous only near base; anthers yellow. Mem. Div. Sav. St. Petersb. 3:t.3. S.H.1:f.20x-y. (*S. angustifolia* Willd., not Wulf.) Cauc. and C. Asia. Cult. 1887. Zone V.—Var. **microstâchya** Herd. Ovary glabrous or slightly pubescent; style usually distinct (*S. m.* Turcz.) W. Siber. to Mongol.—**S. cheilôphila** Schneid. Shrub to 5 m.; young brts. silky: lvs. linear or linear-oblanceolate, 1.5–5 cm. long, glandular-serrulate toward the apex, silky when young, later glabrescent above: catkins on leafy stalks, slender; scales dark toward the apex; ovary silky; stigmas minute, sessile or subsessile. N. China. Cult.? Zone V.—**S. Gilgiàna** Seemen. Shrub to 3 m.; brts. slender, light yellow-brown, pubescent or glabrous: lvs. sometimes opposite, linear or linear-lanceolate, 3–6 cm. long, acute at ends, glaucescent beneath, gray-pubescent when young, later glabrous: catkins sessile, 1.5–3 cm. long; scales broad-oval, black-brown, thinly villous; anthers yellow; ovary short-stalked; stigmas oblong, bifid, about as long as style. Seemen, Sal. Jap. t.13a-d. Japan. Intr. 1897. Zone V.

60. **S. caèsia** Vill. Low shrub to 1 m.; brts. glabrous, brown, lustrous: lvs. crowded, broad-oval or obovate to oblong, 1–3.5 cm. long, acute or acuminulate, rarely obtuse, broad-cuneate to subcordate at base, grayish green above, pale or whitish beneath, glabrous; petiole 2–3 mm. long: catkins on short bracted stalks, with the lvs., about 1 cm. long; scales oval, yellowish, darker at apex, sparingly silky; filaments connate at base, rarely more, villous at base; anthers violet; ovary sessile, villous; stigmas subsessile, red. R.I.11:t.565(c). Alps to C. Asia and Dahur. Cult. 1871. Zone V.

61. **S. Bŏckii** Seemen. Shrub to 3 m.; young brts. densely gray-pubescent: lvs. oblong to obovate, 6–15 mm. long, obtuse or acute, entire or sparingly denticulate, revolute at margin, deep green and glabrous above, bluish white and silky beneath: catkins in autumn in the axils of lvs., sessile, staminate 1–2.5 cm. long, pistillate 3–3.5 cm. long; scales lanceolate, acute, pale: filaments wholly connate; ovary sessile, pubescent; stigmas subsessile, bifid. B.J.29:t.3g-m. Gn.87:609. W. China. Intr. 1908. Zone V.—Distinct species with neat deep green foliage remarkable for its catkins appearing in late summer and autumn.

62. **S. gracilistŷla** Miq. Upright shrub; young brts. gray-tomentose, glabrescent the 2d year: lvs. elliptic-oblong to oblong-obovate or oblong, 5–10 cm. long, acute at ends, serrulate, silky-pubescent when young, later glabrate above, grayish or bluish gray and pubescent beneath; petiole 4–8 mm. long, pubescent; stipules semicordate: catkins before the lvs., sessile, densely silky; staminate to 3.5, pistillate to 8 cm. long in fr.; scales lanceolate, acute, dark at apex; filaments connate, glabrous; anthers yellow; ovary subsessile, silky-pubescent; gland linear; style slender, longer than ovary. S.I. 2:t.7,f.1–9(c). Seemen, Sal. Jap. t.14a-e. G.W.17:62. (*S. Thunbergiana* Bl.) Japan, Korea. Cult. 1900. Zone V.—One of the earliest willows to bloom and conspicuous with its large catkins.

63. **S. sitchénsis** Sanson. Tree to 10 m.; brts. tomentose, glabrescent the 2d year and brown or orange, sometimes bloomy: lvs. oblong-obovate to oblanceolate, 5–12 cm. long, acute or acuminate, sometimes obtuse, entire or glandular-denticulate, pubescent above at first, later dark lustrous green and glabrous, shining silky-tomentose beneath; petiole to 1 cm. long; stipules wanting or small: catkins on short bracted stalks before the lvs., cylindric, staminate 3–5, pistillate 5–7.5 cm. long; fls. partly with 1, partly with 2

stamens; filaments more or less connate; ovary short-stalked, pubescent; style short. S.S.9:t.486. Alaska to Ore. and Mont. Intr. 1918. Zone V?

9. GARRYACEAE Lindl. GARRYA FAMILY

Evergreen shrubs or rarely trees; usually more or less pubescent; brts. quadrangular at first: lvs. opposite, petioled, oval to lanceolate, entire, estipulate: fls. dioecious, in axillary or terminal catkin-like racemes, apetalous, 4-merous; staminate fls. with 4 valvate sepals; stamens 4, with introrse, elliptic to linear anthers on short filaments; pistillate fls. without sepals, but sometimes with 2 small adnate bracts which have been taken for sepals; ovary 1-celled, 2-ovuled, with 2 subulate styles; fr. a rather dry globose or ovoid berry, 1–2-seeded; seed ovoid to subglobose with copious albumen and a minute embryo.—Contains only the following genus with about 15 species in W. N. Am. from Ore. to C. Mex. and 1 species in the W. Indies.

GARRYA Dougl. Characters of the family. (After Nicholas Garry, secretary of the Hudson Bay Company.)

A. Lvs. pubescent below, at least while young: staminate infl. usually simple; pistillate infl. dense, with usually 3 fls. in the axils; bracts broadly connate at the base.
B. Lvs. beneath with curly or woolly hairs. . . . . 1. *G. elliptica*
BB. Lvs. beneath with appressed silky hairs.
C. Mature lvs. densely appressed-silky beneath. . . . . 2. *G. flavescens*
CC. Mature lvs. nearly glabrous beneath. . . . . 3. *G. Fremontii*
AA. Lvs. glabrous: staminate infl. branched; pistillate infl. with remote solitary fls.; at least the lower bracts leaf-like, narrowed at base. . . . . 4. *P. Wrightii*

1. **G. ellíptica** Dougl. Shrub to 2.5 m.; brts. densely pubescent while young; lvs. thick, leathery, elliptic to elliptic-oblong, acute or obtusish and mucronulate, usually rounded at base, revolute and usually undulate at the margin, 4–8 cm. long, densely woolly-tomentose beneath, glabrous above at maturity; staminate spikes to 20 cm. long; pistillate spikes dense, 5–9 cm. long; fr. globose, densely silky-tomentose. Fl.I–III;fr.VI–VIII. B.R.1686(c). G.C.III.35:42,43;60:254. B.S.1:578. Gn.78:114(h). Ore. to Calif. Intr. 1826. Zone VIII?

A hybrid of this species with *G. Fadyenii* Hook. from the W. Indies is **G. Thurétii** Carr. raised 1862 in France: lvs. narrower and longer, to 10 cm. long; pistillate spikes slenderer with usually one fl. in each axil.—Probably too tender.

2. **G. flavéscens** Wats. Shrub to 2.5 m.; brts. silky-pubescent at first: lvs. elliptic, acute and mucronulate, cuneate at base, quite entire, 3–7 cm. long, densely silky-pubescent below, sparingly so above while young; spikes short, the staminate not or little branched; the pistillate dense, 2.5–5 cm. long: fr. globose-ovoid, appressed silky-pubescent. Fl.III; fr. VII–VIII. (*G. Veitchii* var. *f.* Coult. & Evans.) Nev. and Utah to N. Mex. Intr. before 1904. Zone VII or VIII?

3. **G. Fremóntii** Torr. Shrub to 2 m.; brts. soon glabrous: lvs. elliptic to elliptic-obovate, acute or obtusish, mucronulate, cuneate at base, entire or slightly undulate, 4–6 cm. long, at first slightly appressed pubescent on both sides, finally quite glabrous above and slightly pubescent or glabrous beneath: staminate spikes 5–15 cm. long, simple; pistillate spikes 3–7 cm. long, dense; bracts short triangular, acuminate; fls. usually solitary; ovaries pilose: fr. ovoid, stalked, slightly pubescent or nearly glabrous, dark purple. Fl.IV–V; fr.VIII–IX. Wash. to Calif. Intr. 1842. Zone VII?

4. **G. Wrightii** Torr. Shrub to 2 m.; brts. at first sparingly appressed-pubescent, soon glabrous: lvs. elliptic or ovate to oblong, acute at the ends, entire or sometimes rough at the margin, 2.5–5 cm. long, slightly appressed-pubescent at first, soon quite glabrous: spikes slender, staminate more or

less branched, 3–4 cm. long, pistillate 3–7 cm. long, with remote pairs of globose ovaries, the lower bracts leaf-like, but smaller and narrower, the upper lanceolate. Fl.VII–VIII; fr.VIII–XI. E.P.IV.56a:13. Ariz. and N. Mex. to W. Tex. Intr. 1901. Zone VI?—This is apparently the hardiest species.

10. MYRICACEAE Lindl. SWEET GALE FAMILY.

Deciduous or evergreen shrubs or trees; buds small, scaly: lvs. alternate, entire to dentate or pinnatifid, resinous-dotted: fls. monoecious or dioecious, solitary in the axils of bracts forming catkins; perianth wanting; stamens 2–16, with the filaments somewhat united below; anthers 2-celled; ovary 1-celled, with one erect ovule; style short, with 2 filiform stigmas: fr. a small, globose or ovoid drupe or nut usually coated with resinous grains or wax. Two genera with about 35 species widely distributed through both hemispheres chiefly in temp. and subtrop. regions.

A. Lvs. entire or toothed, deciduous or evergreen, estipulate ..... 1. *Myrica*
AA. Lvs. pinnatifid, deciduous, stipulate ..... 2. *Comptonia*

I. MYRÌCA L. Deciduous or evergreen shrubs: leaves alternate, short-petioled, entire or toothed, estipulate: fls. monoecious or dioecious; stamens 2–8, rarely to 16: fr. with or without a waxy covering or resinous-dotted, without or with 2–4 small adnate bracts not exceeding the fr. (*Myrike*, ancient Greek name of a shrub, probably the Tamarisk.)—About 35 species of the same distribution as the family.

A. Fr. more or less coated with wax, globular, bractless, on the growing wood: fls. with or after the lvs.
B. Fr. thickly coated with wax, grayish white: fls. dioecious: lvs. thin.
C. Lvs. acute, generally lanceolate, entire or sharply toothed, persistent: small tree or shrub ..... 1. *M. cerifera*
CC. Lvs. obtuse or acutish, generally oblong to obovate, entire or crenately toothed, deciduous or subpersistent: shrub ..... 2. *M. caroliniensis*
BB. Fr. dark purple, thinly coated with wax: fls. monoecious: lvs. serrate, persistent, leathery ..... 3. *M. californica*
AA. Fr. resinous-dotted, ovoid, with 2 adnate, wing-like bracts, in cone-like axillary catkins at the end of last year's brts ..... 4. *M. Gale*

1. **M. cerífera** L. WAX-MYRTLE. Small tree, occasionally to 12 m., sometimes shrubby: lvs. persistent, lanceolate to oblong-lanceolate, acute, entire or serrate toward the apex, 3–8 cm. long, 1–1.5 cm. broad, resinous-dotted, dark green and glabrous above, paler and sometimes pubescent beneath: fr. 2.5–3 mm. across. Fl.III–IV; fr.X–IV. S.S.9:t.459. G.F.7:476. (*Morella c.* Small, *Cerothamnus c.* Small.) N. J. to Fla., Ark. and Tex. Intr. 1699. Zone VI.

2. **M. caroliniénsis** Mill. BAYBERRY. Shrub to 3 m., with erect or ascending brs.: lvs. deciduous or subpersistent, obovate or elliptic to oblanceolate, obtuse or acutish, shallowly toothed toward the apex, 4–10 cm. long, 1 .5–4 cm. broad, resinous-dotted, sometimes pubescent beneath: fr. 4–5 mm. thick. Fl. III–IV; fr. IX–IV. Em.255,t(c). G.F.7:477. F.E.23:825(h). S.L.274(h). (*M. pensylvanica* Loisel., *M. cerifera* var. *latifolia* Ait., *Morella c.* Small, *Cerothamnus c.* Tidestr.) N. S. to Fla. and Ala., also on shores of Lake Erie. Intr. about 1725. Zone IV.—The aromatic lvs. fall late in autumn; conspicuous in winter with its grayish white fr. Valuable for planting on dry sterile soil.

3. **M. califórnica** Cham. CALIFORNIAN BAYBERRY. Shrub or slender tree, occasionally to 12 m.; brts. pubescent: lvs. persistent, coriaceous, lanceolate to oblong-lanceolate, acute, remotely serrate, 5–10 cm. long, resinous-dotted, lustrous above, glabrous or puberulous beneath and black-dotted: fr. globose or globose-ovoid, 4–6 mm. long, purple. Fl.V–VI; fr.IX–I. S.S.9:t.461. A.I.

1:509. J.H.1852:283. Wash. to Calif. Intr. 1848. Zone VIII.—Handsome shrub with ornamental fr.

4. **M. Gàle** L. Sweet Gale. Shrub to 1 5 m., with upright virgate dark brown brs.: lvs. deciduous, oblanceolate, obtuse or acute, toothed toward the apex, 3–6 cm. long, dark green and glabrous above, usually pubescent beneath: staminate catkins with glabrous brown scales, 7–10 mm. long: fr. compressed, 3-pointed, in dense catkins 8–10 mm. long. Fl.III–IV; fr.IX. Em.255,t(c). B.B.1:584. H.W.2:97. (*Gale palustris* Cheval., *Gale G.* Schneid.) N. Am., s. to Va., Mich. and Wash.; Eu. to N. E. Asia. Cult. 1750. Zone I.—Var. **subglàbra** Fern. Lvs. glabrous or nearly so throughout. (*Gale palustris* var. *s.* Cheval.) N. Am., Eu. Cult. 1864.—Var. **tomentòsa** DC. Brts. pubescent: lvs. pubescent on both sides, more densely below. (*M. t.* Aschers. & Graebn., *Gale japonica* Cheval.) E. Siberia, Japan. Intr. 1892.

2. **COMPTÒNIA** L'Hérit. Deciduous shrub, pubescent: lvs. alternate, petioled, pinnatifid; stipules semicordate: fls. usually monoecious; staminate fls. with 3–4, usually 4 stamens, in cylindric catkins; pistillate fls. with 8 linear-subulate, persistent bracts, at the base, in globose-ovoid aments: fr. a glabrous, ovoid, obtuse nutlet subtended by the elongated subulate bracts, in bur-like heads. (After Henry Compton, bishop of Oxford; 1632–1713.) One species.

C. asplenifòlia Ait. Sweet Fern. Shrub to 1.5 m.; brts. brown, covered with spreading hairs: lvs. linear-oblong, deeply pinnatifid with roundish-ovate, oblique, often mucronulate lobes, 5–12 cm. long and 1–1.5 cm. broad, pubescent, fragrant: staminate catkins about 1.5 cm. long, with acuminate brown ciliate bracts: fr. about 5 mm. long, olive-brown, lustrous. Fl.IV–V; fr.VIII. Em.255(c). B.B.1:586. N.D.2,t.11(c). S.L.273(h). (*C. peregrina* Coult., *Myrica a.* L.) N. S. to N. C., Ind. and Mich. Intr. 1714. Zone II.—Graceful aromatic shrub, doing well in peaty or sandy soil.

11. LEITNERIACEAE Drude. CORKWOOD FAMILY.

Deciduous tree or shrub, with light soft wood and pale slightly fissured bark; buds scaly: lvs. alternate, petioled, entire, penni-nerved, estipulate: fls. dioecious, without perianth, in the axils of bracts, forming axillary catkins, appearing before the lvs.; staminate fls. with 8–12 stamens; anthers oblong, yellow; pistillate fls. consisting of a 1-celled, 1-ovuled ovary subtended by 3–4 gland-fringed scales; style slender, curved, caducous: fr. a drupe.—One monotypic N. American genus.

LEITNÈRIA Chapm. Character of the family. (After Dr. E. F. Leitner, a German naturalist, killed during the Seminole war in Fla.)

L. floridàna Chapm. Corkwood. Shrub or tree, occasionally to 6 m. tall with open loose head, the trunk swollen at base; brts. tomentose at first, later glabrous and brown; buds tomentose: lvs. elliptic-lanceolate to lanceolate, acuminate, cuneate at base, 8–15 cm. long, firm, bright green and pubescent above at least on the veins, paler and reticulate and silky-pubescent below; petioles slender, 3–5 cm. long, tomentose: staminate catkins 2–4 cm. long, with acuminate silky-pubescent bracts, pistillate smaller and slenderer: fr. 1–4 on one ament, oblong, 1.5–2 cm. long, light olive brown. Fl.III(V); fr.V(IX). S.S.7:t.330. H.I.11:t.1044. R.Mo.6:t.30–44. S. Mo. to Tex. and Fla. Intr. 1894. Zone V.—Without particular ornamental qualities, but botanically interesting; it demands peaty humid soil and spreads by suckers.

12. JUGLANDACEAE Lindl. WALNUT FAMILY.

Trees, rarely shrubs, aromatic; brts. terete; buds scaly or naked, usually several superposed: lvs. alternate, odd-pinnate, with short-stalked or sessile lfts., estipulate: fls. monoecious, with or after the lvs.; the staminate fls. in lateral, long, drooping catkins; stamens 3–many, with or without an irregularly lobed perianth; filaments short; anthers oblong; pistillate fls. terminal, solitary or in racemes, in the axils of bracts and subtended by 2 bractlets; calyx 3–5-lobed; ovary inferior, 1- or incompletely 2–4-celled, with one erect ovule; styles 2, stigmatic on the inner face; fr. a drupe or nut; seed large, 2–4-lobed, without endosperm; cotyledons usually corrugate and very oily.—Six genera with about 40 species distributed through the temp. regions of the n. hemisphere.

A. Fr. a winged nutlet.
  B. Frs. in the axils of persistent lanceolate bracts forming an upright cone-like catkin: pith of brs. solid ..... 1. *Platycarya*
  BB. Frs. in pendulous racemes: pith lamellate ..... 2. *Pterocarya*
AA. Fr. an indehiscent or dehiscent large drupe, solitary or in pendulous racemes.
  B. Pith lamellate: husk indehiscent; nut sculptured or rugose ..... 3. *Juglans*
  BB. Pith solid: husk splitting; nut smooth, often angled ..... 4. *Carya*

1. **PLATYCÁRYA** Sieb. & Zucc. Deciduous tree: pith solid: buds small, scaly, brown, nearly glabrous: staminate and pistillate aments upright; fls. without perianth; staminate catkins slender, short-peduncled, usually several below the terminal pistillate catkin; stamens 8–10 in the axils of lanceolate bracts; pistillate catkin solitary, ovoid-oblong; bracts adnate to the ovary forming the wings of the fr.; style 5, short and thick; fr. a small compressed winged nutlet in the axils of stiff lanceolate bracts, forming a small strobile. (Greek *platys*, broad, and *karya*, nut; alluding to the compressed nutlet.)—One species in China.

P. strobilàcea Sieb. & Zucc. Shrub or tree to 12 m.; brts. hairy at first, soon glabrous, yellowish brown or chestnut-brown: lvs. 15–30 cm. long; lfts. 7–15, sessile, ovate- to oblong-lanceolate, slightly falcate, acuminate, doubly serrate, 4–10 cm. long, sparingly pubescent at first, finally nearly glabrous; staminate catkins 5–8 cm. long; fruiting catkins ovoid to oblong, 3–4 cm. long, brown; nutlets about 5 mm. long. Fl.VI; fr.IX. S.Z.2:t.149(c). S.I.1:t. 17(c). M.O.t.37. R.H.1888:88. (*Fortunaea chinensis* Lindl.) China. Intr. 1845. Zone (V) VI.—Handsome shrubby tree with graceful foliage.—*P. sinensis* Mottet is probably only a form of this species.

2. **PTEROCÁRYA** Kunth. WING-NUT. Deciduous trees; pith lamellate; buds stalked, usually several, naked or with a few deciduous scales: lvs. alternate, pinnate, estipulate: fls. monoecious, in pendulous catkins, staminate axillary, on last year's brts., or at base of the new shoots; fls. with 1–4 sepals and two bractlets adnate to an elongated bract; stamens 6–18; pistillate fls. consisting of a 1-celled ovary enclosed in a connate perianth 4-pointed at apex, with 2 bractlets at base; style short, divided into 2 stigmas: fr. a rather small winged nutlet 1-seeded, 4-celled at the base; cotyledons 4-lobed, raised above ground and becoming green. Fls. appearing in June; fruit ripening in September and October. (Greek *pteron*, wing, and *karya*, nut; referring to the winged nut.)—Eight species; 6 in China, 1 in Japan and 1 in W. Asia.

A. Buds naked, several, superposed.
  B. Fr. with 2 distinct wings.
    C. Wings of fr. suborbicular: rachis of lf. terete.
      D. Lfts. 11–25 ..... 1. *P. fraxinifolia*
      DD. Lfts. 5–9 ..... 2. *P. hupehensis*

cc. Wings of fruit oblong: rachis more or less winged; lfts. 11–21.....3. *P. stenoptera*
bb. Fr. winged all around: lfts. 7–9.....4. *P. Paliurus*
aa. Bud with 2–3 dark brown scales, falling during winter, accessory buds wanting: leaflets 11–21.....5. *P. rhoifolia*

1. **P. fraxinifòlia** Spach. Caucasian W. Tree to 30 m., often divided into several stems near base, with wide-spreading head; bark deeply furrowed; brts. minutely scurfy while young, soon glabrous: lvs. 20–45 cm. long; rachis terete, glabrous; lfts. 11–20, ovate-oblong to oblong-lanceolate, acuminate, sharply serrate, 8–12 cm. long, thin, glabrous except stellate hairs in the axils and along the midrib beneath: fr. with semiorbicular wings, 1.5–2 cm. broad, in racemes 20–45 cm. long. L.I.t.20,21. G.C.III.4:381. B.S.2:262; t(h). E.H.2:t.121–3(h). (*P. caucasica* C. A. Mey., *P. Spachiana* Lav., *P. sorbifolia* Dipp.) Cauc. to N. Persia. Intr. 1782. Zone (V).—Var. **dumòsa** Schneid. Shrubby; brts. yellowish brown: lfts. smaller, 5–7 cm. long. (*P. d.* Lav., *P. fraxinifolia* K. Koch, not Spach.)—Tree with handsome dark green lvs. and long drooping racemes of light green frs. during summer. It prefers humid soil.

P. f. × *stenoptera* = **P. Rehderiàna** Schneid. Lf.-rachis more or less winged, at least on vigorous brs.; lfts. somewhat smaller and narrower: wings of fr. oval or oval-oblong, longer than broad. S.T.2:t.137. B.C.5:2854. R.H.1925:372, 373(h). Orig. 1880. —Apparently more vigorous and hardier than either of the parents; spreading by suckers.

2. **P. hupehénsis** Skan. Tree to 20 m., with pale gray smooth bark deeply fissured on old trunks; brts. minutely scurfy: lvs. 15–30 cm. long; rachis terete, glabrous; lfts. 5–9, oblong to oblong-lanceolate or oblong-obovate, acuminate, serrate or serrulate 6–14 cm. long, stellate-pubescent in the axils beneath: fr. including the semi-orbicular wings 2.5–3 cm. across in racemes to 45 cm. long. C. China. Intr. 1903. Zone VI.

3. **P. stenóptera** DC. Tree to 30 m.; young brts. and petioles pilose or nearly smooth: lvs. 20–40 cm. long; rachis winged, the wings sometimes serrate; lfts. 11–23, the terminal one often wanting, oval-oblong to narrow-oblong, acute or sometimes obtusish, serrulate, 4–10 cm. long, slightly pubescent on the midrib and veins beneath: fr. with oblong to oblong-lanceolate upright wings, with the nutlet 1.5–2 cm. long, in racemes 20–30 cm. long. C.C.65. L.I.t.19. R.H.1920:91(l). M.O.415(h). (*P. sinensis* Hort., *P. japonica* Hort.) China. Intr. about 1860. Zone VI.

4. **P. Paliûrus** Batal. Tree to 20 m.; young brts. and the terete leaf-rachis tomentulose or scurfy while young; lvs. 15–25 cm. long; lfts. 7–9, oblong-ovate to oblong-lanceolate, acuminate, very oblique at base, serrulate, 6–15 cm. long, firm, pubescent on the midrib and often on the veins beneath or nearly glabrous: fr. forming with the large wing a circular disk 3–7 cm. across, in racemes 15–25 cm. long. J.H.28:65. C.C.66. C. China. Intr. 1901. Zone VI?

5. **P. rhoifòlia** Sieb. & Zucc. Tree to 30 m.; brts. and the terete leaf-rachis finely pubescent while young or nearly glabrous; buds with 2–3 large brown glabrous scales, about 1.5 cm. long, deciduous during the winter or early in spring; lvs. 20–40 cm. long; lfts. 11–21, ovate-oblong to ovate-lanceolate, acuminate, sharply and finely serrate, 6–12 cm. long, pubescent on the veins beneath or nearly glabrous: fr. with the broad rhombic wings which are broader than long, 2–2.5 cm. across, in racemes 20–30 cm. long. S.I.1:t.16(c). S.Z.2:t.150(c). J.L.50:f.75(h). Japan. Intr. 1888. Zone V.

3. **JÙGLANS** L. Walnut. Deciduous trees, rarely shrubby; brs. with lamellate pith; trunk with scaly furrowed bark; buds with few scales, sessile,

rarely short-stalked: lvs. alternate, odd-pinnate, large, aromatic, estipulate; lfts. opposite, serrate or entire: fls. monoecious; the staminate fls. in lateral pendulous catkins, with 3–40 stamens, in the axils of a bract, bearing 2 bractlets and 1–4 calyx-lobes; pistillate fls. in few- to many-fld. terminal racemes, with 4 calyx-lobes and a 3-lobed involucre consisting of a bract and 2 bractlets; style divided into 2 plumose stigmas; fr. a large indehiscent drupe; nut thick-walled, incompletely 2–4-celled, indehiscent or finally separating into 2 valves; seed 2–4-lobed, remaining within the shell in germination. Fls. appearing with or shortly after the lvs.; fruit in autumn. (Ancient Latin name for *J. regia* and derived from *Jovis glans*, Jupiter's acorn.)—About 15 species in N. and S. America and in the Old World from S. E. Eu. to E. Asia.

A. Lfts. entire or nearly so, glabrous, usually 7–9: nut with thin partition, splitting. 1. *J. regia*
AA. Lfts. serrate, 9–25: nut with thick bony partition, not splitting.
B. Frs. glabrous or finely pubescent, solitary or few: leaf-scars without a prominent pubescent band on their upper edge: nut 4-celled at base.
C. Width of lfts. 1–2.5 cm., rarely more: nut grooved or smooth.
D. Lfts. 17–23, about 1 cm. broad: fr. 1.5–2 cm. thick. . . . . 2. *J. rupestris*
DD. Lfts. 9–19, 2 cm. broad or more: fr. 2.5–5 cm. thick.
E. Lfts. on the midrib beneath and rachis more or less pubescent, 9–13, rarely to 19: nut deeply grooved. . . . . 3. *J. major*
EE. Lfts. nearly glabrous at maturity, 15–19: nut obscurely or not grooved. 4. *J. Hindsii*
CC. Width of lfts. 2.5–5 cm.: nut prominently and irregularly ridged . . . . . 5. *J. nigra*
BB. Frs. viscid-pubescent, racemose: leaf-scars with a prominent band of hairs on their upper edge: nut 2-celled at base.
C. Nut strongly 6–8-ridged.
D. Mature brts. red- or purplish-brown; lfts. with spreading teeth . . . . 6. *J. cinerea*
DD. Mature brts. grayish or yellowish brown; lfts. with shallow teeth directed forward.
E. Lfts. densely pubescent on the veins beneath: fr. 6–10 in pendulous racemes. 7. *J. cathayensis*
EE. Lfts. often glabrescent: fr. in short racemes . . . . . 8. *J. mandshurica*
CC. Nut rugose or nearly smooth; frs. in long pendulous racemes . . . . . 9. *J. Sieboldiana*

1. **J. règia** L. English W. Broad-headed tree to 30 m., with silvery gray bark remaining smooth a long time; brts. glabrous: lfts. 5–9, rarely to 13, elliptic to obovate or oblong-ovate, acute or acuminate, entire, rarely and chiefly on young plants obscurely serrate, 6–12 cm. long, glabrous except small axillary tufts of hairs beneath: staminate catkins 5–10 cm. long; fr. subglobose, glabrous, green, 4–5 cm. across; nut usually ovoid or ellipsoid, pointed, more or less wrinkled, usually thick-shelled. H.W.2:87–89,t.36(c). M.D.1911:197(h). E.H.2:t.74,75(h). (Persian W.) S. E. Eu. to Himal. and China. Long cult. Zone V.—Very variable in the size and shape of the nut and in the thickness and sculpturing of its shell. The Chinese and Himalayan plants distinguished as var. *sinensis* DC. and var. *kamaonica* DC. can hardly be considered geographical forms.—Var. **laciniàta** Loud. Lfts. pinnately dissected. M.G.23:617(h). (Var. *heterophylla* Duchartre, var. *filicifolia* and *aspleniifolia* Hort.)—Var. **monophýlla** DC. Lvs. simple or 3-foliolate. S.H.1:f.44g.—Var. **péndula** Kirchn. Brs. pendulous.—Var. **praepartùriens** Duchartre. A shrubby form producing rather small thin-shelled nuts at an early period, sometimes on plants 2 or 3 years old. (Var. *fertilis* Kirchn., var. *fruticosa* Dipp.)—Much planted as a fruit tree in the warmer parts of this country, particularly in Calif.

J. r. × *Hindsii;* see under No. 4.—*J. r.* × *nigra* = *J. intermedia;* see under No. 5.—*J. r.* × *cinerea* = *J. quadrangulata;* see under No. 6.—*J. r.* × *Sieboldiana* = *J. notha*; see under No. 9.

2. **J. rupéstris** Engelm. Shrub or small tree, rarely 10 m. tall; brts. pubescent when young: lfts. 15–23, lanceolate to narrow-lanceolate, acuminate, finely serrate or nearly entire, 4–8 cm. long, soon glabrous or nearly so, or pubescent on the midrib beneath: stamens 20; ovary pubescent or

tomentose: fr. globose, rarely ovoid, 1.5–2 cm. across, sometimes nearly glabrous at maturity; nut thick-shelled, with deep longitudinal grooves, about 1.5 cm. across. S.S.7:t.335. S.L.238(h). Texas, N. Mex. Cult. 1868. Zone V.—A shrubby species with graceful foliage, very distinct on account of its numerous small and narrow lfts. A somewhat similar small-leaved species is *J. californica* which see under No. 4.

3. **J. màjor** Heller. Tree to 20 m. with a rather narrow head; brts. pubescent while young: lfts. 9–13, rarely to 19, oblong-lanceolate to ovate, acuminate, cuneate or rounded at base, coarsely serrate, 7–10, the lowest pair 3–5 cm. long, soon glabrous or pubescent on the midrib beneath; stamens 30–40: fr. subglobose or ovoid and sometimes pointed, 2.5–3.5 cm. across, rufous-tomentulose; nut subglobose, slightly compressed, deeply grooved, thick-shelled, 2–3 cm. across. S.M.172. (*J. rupestris* var. *m.* Torr., *J. Torreyi* Dode.) N. Mex., Ariz. and Colo. Intr. 1894? Zone VII.

4. **J. Híndsii** Rehd. Round-headed tree to 15 or occasionally to 25 m.; brts. densely pubescent while young: petioles villous; lfts. 15–19, ovate-lanceolate to lanceolate, long-acuminate, usually rounded at base, coarsely serrate, 6–10 cm. long, pubescent on the midrib and veins beneath: stamens 30–40: fr. subglobose, 3–5 cm. across, soft-pubescent; nut nearly globose, 2.5–3.5 cm. across, thick-shelled, faintly grooved. (*J. californica* var. *H.* Jeps.) S.S.7:t.337,f.5–8. S.M.175. Gn.49:278(h). C. Calif. Cult. 1878. Zone VII or VIII.—Var. **quercinifòlia** Babcock. Lfts. usually 3, rarely 1, ovate to elliptic, obtuse or truncate, 1.5–5.5 cm. long. Univ. Calif. Pub. Agr. Sci. 2:t.20,f.1–2.—Much planted in Calif. as a street tree and used as stock for the English Walnut.

J. H. × *regia* = "Paradox" of Burbank.—*J. H.* × *nigra* = "Royal" of Burbank. Am. Nut Jour. 11:61(h).

A closely related species is **J. californica** S. Wats. Shrub or small tree: lfts. usually 11–15, oblong-lanceolate, acute, 2.5–6.5 cm. long, glabrous: fr. globose, 1–2 cm. across; nut deeply grooved. S.S.7:t.337,f.1–4. S.M.174. A.I.1:509. S. Calif. Cult. 1889. Zone VIII?—Var. **quercìna** Babcock. Lfts. 1–5, usually 3, broad-ovate to oblong. J.S.51–53. (*J. Hindsii* var. *q.* Rehd., *J. quercifolia* Pierce.) Orig. 1900.

5. **J. nígra** L. Black W. Tall tree to 50 m. with round head; bark deeply furrowed, brown; brts. pubescent: lfts. 15–23, ovate-oblong to ovate-lanceolate, acuminate, rounded at base, irregularly serrate, 6–12 cm. long, at first minutely pubescent above, finally nearly glabrous and somewhat lustrous, pubescent and glandular beneath: staminate catkins 5–12 cm. long; stamens 20–30; pistillate fls. 2–5: fr. globose or slightly pear-shaped, 3.5–5 cm. across, pubescent; nut ovoid and pointed or subglobose and sometimes broader than high, slightly compressed, strongly and irregularly ridged, 3–4 cm. across. S.S.7:t.333,334. Em.211(c). E.H.2,t.76–77(h). G.C.III.30:303(h). Mass. to Fla. w. to Minn. and Tex. Cult. 1629. Zone IV.—Ornamental tree with round head and handsome dark green foliage; its timber is highly valued.

J. n. × *regia* = **J. intermèdia** Carr. Similar to *J. regia*: lfts. usually 11, ovate to elliptic-ovate, remotely denticulate, dark green and glabrous except axillary tufts of hairs below: fr. smooth; nut deeply sculptured. The type of the hybrid is var. **pyrifòrmis** Carr. Young shoots glandular-pubescent: fr. obovoid. R.H.1863:30. Gn.50:478.—Var. **Vilmoreàna** Carr. Brts. glabrous: fr. subglobose, apiculate. G.F.4:52(h),53. M.D.1911:197(h). B.C.3:1724(fr). (*J. Vilmoriniana* Vilm.) —Here belongs probably the so-called "James River Hybrid." F.L.2:133,134(h), which has large oblong-ovoid nuts about 5 cm. long very much like *J. regia gibbosa* Carr. (R.H.1861:428) in shape, but with numerous longitudinal irregular ridges separated by deep grooves.—*J. n.* × *Hindsii* see under No. 4.

6. **J. cinérea** L. BUTTERNUT. Tree occasionally to 30 m., with gray deeply fissured bark; brts. pubescent, glandular while young: petiole and rachis glandular-pubescent; lfts. 11–19, oblong-lanceolate, acuminate, appressed-serrate, 6–12 cm. long, finely pubescent above, pubescent and glandular beneath: staminate catkins 5–8 cm. long; pistillate spikes 5–8-fld.: frs. 2–5, ovoid-oblong, 7–10 cm. long, viscid-pubescent; nut ovoid-oblong, with 4 prominent and 4 less prominent, sharp irregular ridges and many broken ridges between, thick-shelled. S.S.7:331,332. Em.207,t.(c). H.H.50,51(b). F.L.7:56,t.(h). N. B. to Ga., w. to Dak. and Ark. Cult. 1656. Zone III.—Less handsome and less valuable than the preceding species.

J. c. × *regia* = **J. quadrangulàta** Rehd. Similar to *J. regia*: lfts. usually 9, oval to oblong, obscurely and remotely serrate, slightly pubescent beneath: fr. sparingly produced, subglobose; nut ovoid-oblong, deeply sculptured; walls thinner than those of *J. cinerea*. G.F.7:435. R.H.1870:494. Gn.50:578. (*J. intermedia quadrangulata* Carr., *J. intermedia alata* Carr., *J. alata* Schelle.) Orig. before 1870. —*J. c.* × *Sieboldiana* = *J. Bixbyi*; see under No. 9.

7. **J. cathayénsis** Dode. CHINESE W. Tree to 25 m.; brts. glandular-pubescent: lvs. up to 1 m. long; lfts. 9–17, ovate- or obovate-oblong, acuminate, obliquely rounded or subcordate at base, serrulate, 8–15, or occasionally to 22 cm. long, dark green and sparingly pubescent above, more densely pubescent beneath, midrib and petiole glandular: staminate catkins 20–35 cm. long: frs. 6–10 in pendulous racemes, ovoid, pointed, 3–4.5 cm. long; nut ovoid, pointed, 6–8-angled with broken and spiny ridges. G.C.III.50:189; 77:203. S.L.236(h). C. China. Intr. 1899. Zone V.

A vigorously growing tree with handsome large foliage; the nut is edible, but the walls are thick and the kernel small.

8. **J. mandshurica** Maxim. MANCHURIAN W. Tree to 20 m., with broad round head; brts. glandular-pubescent: lfts. 9–17, ovate-oblong to oblong, acute, serrulate, 7–18 cm. long, sparingly pubescent above at first, finally glabrous or nearly so, pubescent below and usually densely glandular-pubescent on the midrib and rachis: staminate catkins about 10 cm. long; pistillate catkins 5–10-fld.: fr. subglobose or ovoid, pointed, 4.5–5.5 cm. long; nut ovoid, pointed, with 8 prominent, sharply edged ridges and irregular broken ridges between, 4–4.5 cm. long. G.C.III.30:302. Manch., Amurland. Intr. 1859. Zone V.

A related species is the incompletely known **J. stenocárpa** Maxim. referred by some botanists to *J. mandshurica*, but the plant in cultivation differs in its nearly glabrous brts., in the absence of the prominent hairy band above the leaf-scars, in the glabrescent lvs. and in the very large terminal lfts. which is up to 18 cm. long and to 10 cm. broad: nut cylindric-oblong. Mél. Biol. 8:632(fr). Manch. Cult. 1903. Zone V.

9. **J. Sieboldiàna** Maxim. Tree to 20 m., with broad round head, very similar in its brts. and lvs. to the preceding species, but quite different in its fls. and fr.: the staminate catkins 15–30 cm. long, the pistillate 12–20-fld.; fr. globose to ovoid, viscid-pubescent, nut subglobose or ovoid, pointed, with thick projecting sutures, rugose, thick-shelled, 2.5–3.5 cm. long. S.I.2:t.5(c). R.H.1878:414,415. (*J. ailanthifolia* Carr.) Japan. Intr. 1860. Zone IV.—Var. **cordifórmis** Mak. Nut heart-shaped or ovoid, much flattened, sharply 2-edged, with a shallow longitudinal groove in the middle of the flat sides, smooth, rather thin-shelled. S.I.1:t.17(c). G.C.III.30:292,t. B.C.3:1724. (*J. c.* Maxim.) Japan. Intr. 1862 or 1863.—To this species beong the following species of Dode: *J. Allardiana, J. coarctata, J. Lavallei* (L.I.t.1,2), *J. subcordiformis*; the last named is scarcely different from the var. *cordi-*

formis, while the second and third are intermediate between this variety and the type (B.D.1909:33,38,39).

J. S. × *regia* = **J. notha** Rehd. Lfts. 7–9, elliptic to elliptic-oblong, glabrous above, glabrescent beneath, sparingly and minutely denticulate: nut much like that of *J. Sieboldiana*. Orig. 1878.—Var. **Batèsii** Rehd. (*J. S. cordiformis* × *regia*.) Nut slightly compressed, more acuminate and smoother.—*J. S.* × *cinerea* = **J. Bixbyi** Rehd. Nut rough-shelled, but less deeply and less sharply ridged than in *J. cinerea*. Orig. about 1903.—Var. **lancastriēnsis** Rehd. (*J. S. cordiformis* × *cinerea*.) Nut slightly compressed and more acuminate.

4. **CÁRYA** Nutt. Hickory. Deciduous trees; brs. with solid pith; buds scaly: lvs. alternate, odd-pinnate, estipulate; lfts. 3–17, opposite, serrate: fls. monoecious, with the lvs.; staminate fls. in axillary, usually ternate pendulous catkins, each fl. in the axil of a 3-lobed bract, stamens 3–10; pistillate fls. sessile, in terminal 2–10-fld. spikes, consisting of a 1-celled ovary enclosed by a 4-lobed involucre; stigmas 2, short: fr. globose to oblong, with a husk separating more or less completely into 4 valves; nut smooth or slightly rugose, often angled, 4-celled at base, 2-celled at apex; cotyledons remaining enclosed in the shell. (Greek *karya*, Walnut tree.) Syn. *Hicoria* Raf. About 20 species in E. N. Am., s. to Mex.; 1 in China.—Trees with handsome foliage, the head usually oblong or ovoid in outline; often planted as ornamental trees. Most species have edible nuts, some of commercial importance; see Rep. U. S. Dept. Agric. Div. Pomol. Nut-culture (1896) for illustrations of nuts. Several species are valued for their strong and tough wood..

A. Bud-scales 4–6, valvate: lfts. 5–17, usually lanceolate and often falcate: fr. with winged sutures; nut usually thin-shelled. (Apocarya DC.)
  B. Nuts mostly elongated, nearly terete; husk thin, splitting to the base; kernel sweet; cotyledons entire or emarginate.
    C. Lfts. 11–17, tomentose and glandular when young: fr. 3.5–8 cm. long....1. *C. pecan*
    CC. Lfts. 5–11, scurfy-pubescent when young: fr. about 3.5 cm. long. 2. *C. myristicaeformis*
  BB. Nuts usually as broad as long, compressed, irregularly angled and reticulate; kernel bitter; cotyledons deeply 2-lobed.
    C. Winter-buds dark reddish brown: lfts. 7–13: husk splitting to the base. 3. *C. aquatica*
    CC. Winter-buds bright yellow, glandular: leaflets 5–9: husk splitting somewhat below the middle....4. *C. cordiformis*
AA. Bud-scales imbricate, more than 6: fr. not or slightly winged; nut usually thick-shelled: lfts. 3–9, not falcate; the uppermost larger and often obovate. (Eucarya DC.)
  B. Buds small, 6–15 mm. long: nut slightly or not angled; husk usually thin.
    C. Petioles and lvs. beneath glabrous: lfts. 5–7: nut thin-shelled.
      D. Fr. obovoid, splitting only to the middle: kernel usually bitter....5. *C. glabra*
      DD. Fr. ovoid, splitting tardily to the base: kernel sweet....6. *C. ovalis*
    CC. Petioles and lvs. beneath at least on the veins pubescent; lfts. usually 7. 7. *C. pallida*
  BB. Buds large, terminal ones 1.5–2.5 cm. long: nut angled; kernel sweet.
    C. Brts. and petioles tomentose: bark close: husk not separating quite to the base. 8. *C. alba*
    CC. Brts. and petioles glabrous or pubescent: bark shaggy: husk separating to the base.
      D. Lfts. 7–9: brts. pale orange....9. *C. laciniosa*
      DD. Lfts. usually 5: brts. light red-brown....10. *C. ovata*

1. **C. pècan** Engl. & Graebn. Pecan. Tree to 50 m.; bark deeply furrowed; buds pubescent, yellow; brts. pubescent while young: lfts. 11–17, short-stalked, oblong-lanceolate, serrate or doubly serrate, 10–18 cm. long, glandular and tomentose when young, becoming glabrous; petiole glabrous or pubescent: frs. in spikes of 3–10, oblong, 3.5–8 cm. long; nut ovoid or oblong, 2.5–5 cm. long, smooth, light brown marked with dark brown, 2-celled at base; kernel sweet. S.S.7:t.338,339. R.Mo.7:t.1(h),2(b). Am. For.28:459(h). (*Hicoria p.* Brit., *C. olivaeformis* Nutt., *C. illinoensis* K. Koch.) Iowa and Ind. to Ala., Tex. and Mex. Intr. about 1766. Zone (V).—Planted in the S. States as a fruit tree; many named vars. are in cult. (see B.C.5:2522–3).

C. p. × *cordiformis* = **C. Brŏwnii** Sarg. Similar to *C. pecan*, but differing chiefly in its 11 or rarely 9 lfts., in the ovoid fr. rounded at base and 3.5–4 cm. long and in the compressed nut. S.T.2:t.178. Intr. 1909.—There are also hybrids with *C. alba* = **C. Schneckii** Sarg. and with *C. laciniosa* = **C. Nussbaŭmeri** Sarg. (see R.Mo.7:t.20–23).

A closely related species is **C. texàna** DC. Lfts. 7–11, broader and nearly sessile: nut smaller, red-brown, rough and obscurely 4-angled. S.S.14:t.719. (*Hicoria t.* Le Conte.) E. Tex. Intr. 1900. Zone V.

2. **C. myristicaefórmis** Nutt. Nutmeg H. Tree to 30 m.; bark dark brown, broken into small appressed scales; buds with brown scurfy pubescence; brts. coated with yellow or brown scales, dark reddish brown the second year: lfts. 5–11, short-stalked or subsessile, ovate-lanceolate, the upper ones oblong-obovate, acuminate, pubescent or glabrous and silvery white beneath, 8–12 cm. long: fr. usually solitary, obovoid or ellipsoid, 4-winged to the base, 3–4 cm. long, husk splitting nearly to base; nut ovoid, reddish brown, marked with irregular bands and spots, thick-shelled, 4-celled below; kernel sweet. S.S.7:t.342,343. (*Hicoria m.* Brit.) S. C. to Ark. and Mex. Intr. 1890. Zone VI.—Tree with handsome foliage.

Related to this species seems the only Chinese species, **C. cathayénsis** Sarg. Tree to 20 m.; young brts. covered with orange-yellow scales: lfts. 5–7, short-stalked, ovate to ovate-lanceolate, 10–14 cm. long, yellow-scurfy beneath and pilose on the midrib: fr. obovoid, 4-winged, nut ovoid, obscurely 4-angled, 2–2.5 cm. long; kernel sweet. C.C.63. Jour. Hered. 9:280(h). E. China. Intr. ?

3. **C. aquâtica** Nutt. Bitter Pecan. Small tree rarely to 30 m.; bark light brown, separating into long and thin, plate-like scales; buds dark reddish brown; brts. slightly glandular or loosely tomentose at first, finally dark red-brown: lfts. 7–13, lanceolate, long-acuminate, serrate, 8–12 cm. long, yellow-tomentose while young, glabrous at length: frs. often 3–4, ovoid or obovoid, compressed, 4-winged, 2.5–3.5 cm. long; nut broadly obovoid, much compressed, 4-angled, irregularly and longitudinally wrinkled, dull reddish brown; kernel bitter. S.S.7:t.344.345. R. Mo. 7:t.3(h),4(b). (*Hicoria a.* Brit.) Va. to Ill., s. to Fla. and Tex. Intr. about 1800. Zone VII?

4. **C. cordifórmis** K. Koch. Bitternut. Tree to 30 m.; bark broken into thin scales, light brown; brts. rusty pubescent at first, finally glabrous, lustrous and reddish brown: lfts. 5–9, ovate-lanceolate to lanceolate, acuminate, serrate, 8–15 cm. long, light green and pubescent below, particularly along the midrib, nearly glabrous at length: fr. obovoid to subglobose, 4-winged above the middle, 2–3.5 cm. long; husk thin, splitting somewhat below the middle; nut subglobose to broadly ovoid, slightly compressed, abruptly contracted into a short point, nearly smooth, gray, thin-shelled; kernel bitter. S.S.7:340,341. E.H.3:t.170,171(h). F.L.5:81,t(h). (*Hicoria c.* Brit., *H. minima* Brit., *C. amara* Nutt.) Que. to Minn., s. to Fla. and La. Intr. about 1650. Zone IV.—Tree with rather broad head and handsome foliage.

C. c. × *pecan* = *C. Brownii;* see under No. 1.

5. **C. glâbra** Sweet. Pignut. Tree sometimes to 40 m.; bark dark gray, fissured, close; buds with the outer glabrous scales deciduous, the inner pubescent; brts. glabrous or nearly so: lfts. 3–7, usually 5, oblong to oblong-lanceolate, acuminate, sharply serrate, 8–15 cm. long, nearly glabrous; petioles and rachis glabrous: fr. usually obovoid, slightly winged toward the apex, about 2.5 cm. long and 2 cm. across; husk splitting usually only to the middle; nut usually brownish, not angled; kernel usually astringent. S.T.2:t.179. S.M.192. E.H.3:t.172(h). B.C.2:677(h). R.Mo.7:t.7(b). (*Hicoria g.* Brit., *C. porcina* Nutt.) Me. to Ont., s. to Fla., Ala., and Miss. Intr. about 1750. Zone IV.—Tall handsome tree.—Var. **megacárpa** Sarg.

Fr. 2.5–5 cm. long and about 3 cm. across, obovoid, slightly flattened, with thick husk splitting earlier and a thick-shelled nut. S.T.2:t.180. S.M.193. (*C. m.* Sarg.) N. Y. to Mo. and Fla. Intr. 1912. Zone V.

6. **C. ovàlis** Sarg. SMALL PIGNUT. Tree similar to the preceding; bark close and furrowed on young trees, often shaggy on old trunks; brts. scurfy-pubescent at first, soon glabrous: lfts. 5–7, oblong-ovate to oblong-lanceolate or oblong-obovate, 8–15 cm. long, finely serrate, often scurfy-pubescent while young, becoming glabrous: fr. subglobose to ellipsoid, 2–3 cm. long, densely scaly, slightly winged, splitting tardily to near the base; nut slightly flattened, usually rounded at apex, sometimes slightly angular, brownish, rather thin-shelled; kernel sweet. S.M.194. A.G.11:381,f.1,2,5,8,10. B.C.2:678(h). R.Mo.7:t.10(b). (*C. microcarpa* Nutt., partly, *Hicoria m.* Brit., *H. glabra* var. *m.* Trel.—False Shagbark.) Mass. to Wis., s. to Ga., Ala. and Miss. Intr. probably before 1800. Zone IV.—Very variable in the shape of its fr.: Var. **obcordàta** Sarg. Fr. subglobose or broad-ellipsoid; nut angled, broader than high, often obcordate. S.S.7:t.354,f.5,6,7,9. S.M.194.—Var. **odoràta** Sarg. Lfts. usually broader, glandular beneath: fr. subglobose to ellipsoid, with distinctly winged sutures, splitting freely to the base; nut slightly higher than broad, very slightly ridged, gray. S.S.7:t.354,f.8. S.M.195. R.Mo.7:t.8(b). (*Hicoria glabra* var. *o.* Sarg.) Conn. to Pa. and Mo.—Var. **obovàlis** Sarg. Fr. obovoid; nut much compressed, pointed or rounded at apex, rounded at base. S.M.196. Mass. to Va. and Mo.—Var. **boreàlis** Sarg. Bark scaly; brts. and lvs. pubescent at first: fr. ellipsoid, flattened, about 2 cm. long, very narrowly winged, often incompletely splitting; husk rather thick; nut ellipsoid, ridged, whitish. B.T.236. (*Hicoria b.* Ashe.) Mich. and Ont.—Var. **hirsùta** Sarg. Bark scaly; petioles and lfts. beneath pubescent: fr. obovoid, narrowed at base, compressed. (*Hicoria glabra h.* Ashe.) N. C. Intr. 1919.

7. **C. pállida** Engl. & Graebn. Tree with very rough pale bark; brts. purple-brown; buds acute, with 5–9 scales: lfts. usually 7, sometimes 9, oblong-lanceolate to lanceolate, 8–12 cm. long, finely serrate, bright green above, beneath with silvery scales and scurfy-pubescent while young; petiole and rachis pubescent with stellate hairs at least while young: middle lobe of the staminate bract longer than lateral lobes: fr. subglobose to obovoid, 2–3 cm. long; husk rather thin, tardily splitting to the base; nut flattened, whitish, rather thin-shelled. G.F.10:305. S.M.190. (*Hicoria p.* Ashe.) Ala. and Tenn. Intr. 1898. Zone V.

A related species is **C. Buckleÿi** Durand. Tree 10–15, rarely to 20 m.; bark dark, furrowed; young brts. rusty-pubescent: lfts. usually 7, lanceolate or oblanceolate, 8–15 cm. long, pubescent on the veins beneath; petioles rusty-pubescent and villous when young: fr. subglobose, about 3.5 cm. long; husk splitting to the base; nut acute at apex, 4-angled above the middle, red-brown; kernel sweet. S.T.2:t.182. S.M.197. (*C. texana* Buckl., not Le Conte.) Tex. to Okl. and Ark. Intr. 1909. Zone V.—Var. **arkansàna** Sarg. Tree to 25 m.: fr. obovoid, rounded at apex, 3.5–4 cm. long, splitting to the middle or nearly to the base; nut rounded at ends, often slightly obovoid, slightly angled, pale brown. S.T.2:t.181. S.M.198. (*C. a.* Sarg.) Ark. and Okl. Intr. 1910. Zone V.—Var. **villòsa** Sarg. Tree to 15 m.: lfts. 5–7, oblong-elliptic to oblanceolate, more pubescent beneath; petiole and rachis pubescent when young: fr. broad-ellipsoid or obovoid, rounded at apex, 2–3 cm. long, tardily splitting to base by 1–2 sutures or indehiscent; nut broad-ovoid, pointed at apex, slightly angled, faintly tinged red. S.S.7:t.355. S.M.199. R.Mo.7:t.9(b). (*Hicoria v.* Ashe, *C. v.* Schneid., *C. glabra* var. *v.* Robins.) Mo. Intr. 1915.

8. **C. alba** K. Koch. MOCKERNUT. Tree sometimes to 30 m.; bark rather close, ridged: brts. tomentose, sometimes nearly glabrous in autumn; ter-

minal bud 1.5–2 cm. long: lfts. 7–9, oblong to oblong-lanceolate, acuminate, serrate, 8–18 cm. long, densely pubescent and glandular below, very fragrant when crushed; petiole and rachis hirsute or tomentose: fr. subglobose or pear-shaped, 3.5–5 cm. long; husk thick, splitting to the middle or nearly to the base; nut subglobose to ellipsoid, slightly flattened, angled, light brown, thick-shelled; kernel sweet. S.S.7:t.350. B.S.1:301,t(h). R.Mo.7:t. 11(b). (*Hicoria a.* Brit., *C. tomentosa* Nutt.—Big-bud H.) Mass. to Ont. and Neb., s. to Fla. and Tex. Intr. 1766. Zone IV.—Handsome tree.

C. a. × *pecan* = *C. Schneckii;* see under no. 1.

9. **C. laciniòsa** Loud. Big Shellbark-H. Tree to 40 m.; bark shaggy; brts. pubescent while young, later nearly glabrous and orange; terminal bud to 2.5 cm. long: lfts. 7–9, oblong-lanceolate, 10–20 cm. long, acuminate, serrate, pubescent beneath; petiole and rachis pubescent or glabrous, often persistent during winter: fr. ellipsoid to subglobose, 4–7 cm. long, 4-ribbed above the middle; nut ellipsoid or subglobose, compressed and obscurely 4-angled, pointed at ends, yellow or reddish, thick-shelled; kernel sweet. S.S.7:t.348,349. (*Hicoria l.* Sarg., *Carya sulcata* Nutt.—Bottom Shellbark H., Kingnut.) N. Y. to Iowa, s. to Tenn. and Okl. Intr. about 1800. Zone V.

C. l. × *pecan* = *C. Nussbaumeri;* see under no. 1.

10. **C. ovàta** K. Koch. Shagbark H. Tree, occasionally to 40 m.; bark light gray, shaggy; brts. scurfy-pubescent at first, usually soon glabrous and bright reddish brown; inner bud-scales becoming large and conspicuous when unfolding: lfts. 5, rarely 7, elliptic to oblong-lanceolate, 10–15 cm. long, acuminate, serrate and densely ciliate, pubescent and glandular below when young, finally glabrous: fr. subglobose, 3.5–6 cm. long, husk thick, splitting to base; nut ellipsoid to broad-obovoid, slightly flattened and angled, white, rather thin-shelled; kernel sweet. S.S.7:t.346, 347. G.F.2:460(b). F.L.4:569 t(h). E.H.3:t.173(h). (*Hicoria o.* Brit., *Carya alba* Nutt.—Little Shellbark H.) Que. to Minn., s. to Fla. and Tex. Intr. 1629. Zone IV.—Var. **Nuttállii** Sarg. Fr. smaller; nut subglobose, usually obcordate, much compressed and angled, about 1.5 cm. across. N.S.1:t.13(c). (*C. microcarpa* Nutt.) Mass. to Pa. and Mo.—Var. **fraxinifòlia** Sarg. Lfts. lanceolate or oblanceolate, the terminal one 12–15 cm. long and 4–5 cm. broad; fr. smaller, pointed. W. N. Y. Intr. 1911.—Next to the Pecan this species is the best as a fruit tree and several named varieties are in cult.; one of the best known is var. **Halèsii** Hort. with large, thin-shelled nuts.

C. o. × *cordiformis* = **C. Làneyi** Sarg. Bark close, dark gray; terminal bud about 1 cm. long, the outer scales glabrous, deciduous, the inner lepidote, yellow: lfts. 5, lanceolate to oblanceolate: fr. ovoid, 3–5 cm. long; nut compressed, slightly obovoid, thin-shelled; kernel large, sweet. W. N. Y. Intr. 1913.—Var. **chateau-gayénsis** Sarg. resembles more the Bitternut and has usually 7 lfts., a smaller fr. with a bitter kernel. Que. Intr. 1895.

A closely related species is **C. carolìnae-septentrionàlis** Engl. & Graebn. Lfts. 3–5, lanceolate, glabrous: fr. smaller; nut thin-shelled. S.S.14:t.720. (*Hicoria c.* Ashe.) N. C. to Ga. Intr. 1904. Zone V.

13. BETULACEAE Agardh. BIRCH FAMILY

Deciduous trees or shrubs: lvs. alternate, petioled, usually straight-veined, stipulate: fls. monoecious, rarely dioecious; staminate fls. in catkins, pistillate in clusters, spikes or catkins; stamens 2–10 to each bract, with or without calyx; ovary 2-celled, with 2 pendulous ovules in each cell; styles 2: fr. a 1-seeded nut; seed without albumen.—Six genera with more than 100 species in the temp. and colder regions of the n. hemisphere.—Monograph by Winkler in E.P.IV.101.

A. Nut small, compressed and often winged, without involucre, 2–3 in the axis of scales forming catkins; stamens 2–4, with 2–4-parted calyx. (Subfam. 1. BETULEAE.)
B. Scales of fruiting catkins thin, 3-lobed, deciduous; stamens 2, bifid: buds sessile with 3 or more scales.....1. *Betula*
BB. Scales of fruiting catkins, 5-lobed, woody, persistent; stamens 4: buds usually stalked and with 2 valvate scales.....2. *Alnus*
AA. Nut with a foliaceous involucre, forming clusters or spikes; stamens 3–10, without calyx: buds with several scales. (Subfam. 2. CORYLEAE.)
B. Frs. in pendulous slender spikes: buds elongated, acute; lvs. with 9 or more pairs of veins.
C. Involucre of the fr. flat, 3-cleft or dentate, leafy; staminate catkins appearing in spring.....3. *Carpinus*
CC. Involucre a bladder-like closed bag; staminate catkins formed in autumn. 4. *Ostrya*
BB. Frs. in clusters: buds ovoid, obtuse or acute: staminate catkins naked during winter: lvs. ovate or orbicular-ovate, with usually 5–8 pairs of veins.
C. Anthers undivided, not hairy at apex: fls. with the lvs.: nut small, enclosed by the tubular involucre 3-fid. at apex.....5. *Ostryopsis*
CC. Anthers divided, with tufts of hairs at apex: fls. before the leaves: nut large, wholly or partly enclosed by a leafy involucre irregularly laciniate at apex.....6. *Corylus*

1. **BÈTULA** L. BIRCH. Deciduous shrubs or trees: buds with several imbricate scales: lvs. petioled, generally ovate, serrate or dentate to lobulate, with few or many veins: fls. monoecious; staminate catkins elongated, formed in autumn and remaining naked during winter, every bract with 3 fls., each fl. with a minute 4-parted calyx and 2 stamens divided at the apex; pistillate catkins oblong or cylindrical, each bract with 3 fls. without calyx: fr. a minute nut usually with membranous wings, at maturity droping together with the 3-pointed bract from the slender rachis. (The ancient Latin name of the Birch.) About 40 species in the n. hemisphere, in N. Am. s. to Colo., Ala. and Calif., in Asia s. to the Himal.—Ornamental trees or shrubs, some valued as timber trees; they are essentially northern trees and mostly short-lived; most of them are well suited for planting on poor sandy or boggy soil.

A. Lvs. with 7 or more pairs of veins, usually more or less impressed above.
B. Strobiles cylindric, pendulous, racemose or solitary and 3.5–11 cm. long; wing of the fruit much broader than the nutlet: lvs. 7–14 cm. long. (Sect. 1. ACUMINATAE Reg.)
C. Lvs. cordate at base: strobiles 2–4, racemose, 1.5–7 cm. long. 1. *B. Maximowicziana*
CC. Lvs. rounded or subcordate at the base: strobiles solitary; bracts without distinct lateral lobes.....2. *B. luminifera*
BB. Strobiles solitary, 2–5 cm. long, bracts with distinct lateral lobes: wings of fr. not or not much broader than nutlet. (Sect. 2. COSTATAE Reg.)
C. Lvs. light green beneath: strobiles subglobose to cylindric.
D. Strobiles cylindric or subcylindric, sometimes ellipsoid in No. 3.
E. Wings of fr. ⅓–½ as broad as nutlet: lvs. triangular-ovate to ovate-oblong.
F. Petioles 1–2 cm. long.
G. Lvs. triangular-ovate, truncate or subcordate at base.....3. *B. Ermani*
GG. Lvs. ovate to ovate-oblong rounded, rarely broadly cuneate at base.
H. Brts. glandular and villous lvs. ovate, pubescent beneath..4. *B. utilis*
HH. Brts. glabrous, sometimes slightly glandular: lvs. often ovate-oblong, glabrous beneath.....5. *B. albo-sinensis*
FF. Petioles 0.5–1 cm. long; leaves rounded or broad-cuneate at base, 4–8 cm. long.....6. *B. Schmidtii*
EE. Wings much narrower than nutlet: lvs. ovate to elliptic or obovate, 6–12 cm. long.....7. *B. Medwedewi*
DD. Strobiles subglobose to ellipsoid.
E. Lvs. oblong-ovate, acuminate, 5–12 cm. long: petioles 0.5–2.5 cm. long: wings of fr. about ½ as broad or as broad as nutlet: bark with cherry-flavor.
F. Veins very prominent, 3–4 mm. distant; lvs. firm, long-acuminate, 5–8 cm. long.....8. *B. costata*
FF. Veins less prominent, about 5 mm. distant; lvs. rather thin, 6–12 cm. long.
G. Serration of lvs. coarse, usually 2 teeth between two veins: lvs. usually subcordate; petiole 1–2.5 cm. long.....9. *B. grossa*
GG. Serration fine, usually 3–4 teeth between two veins: petioles 0.5–1.5, rarely 2 cm. long.
H. Bracts of strobiles glabrous: young brts. nearly glabrous: bark close, brown.....10. *B. lenta*
HH. Bracts of strobiles pubescent: young brts. pubescent: bark yellowish, flaky.....11. *B. lutea*
EE. Lvs. broad-ovate to elliptic, acute, rarely acuminate, 2–7 cm. long; petioles 3–12 mm. long: wings of frs. very narrow.
F. Pairs of veins 7–10: petioles 6–12 mm. long.
G. Lvs. broad-ovate, usually short-acuminate, 4–7 cm. long: strobiles 2.5–3 cm. long.....12. *B. globispica*

GG. Lvs. ovate, acute, 2–5 cm., rarely to 6 cm. long: strobiles 1.5 cm. long. 14. *B. chinensis*
FF. Pairs of veins 10–20; lvs. acute, usually rufous-villous beneath on the veins; petioles 3–8 mm. long: shrub....13. *B. Potanini*
CC. Lvs. whitish beneath, rhombic-ovate, with 7–9 pairs of slightly impressed veins: strobiles cylindric....15. *B. nigra*
AA. Lvs. with 3–7 pairs of veins (sometimes 8 in No. 24).
B. Wings of fr. broader than the nutlet (½ as broad in No. 24): trees, rarely shrubs. (Sect. 3. Excelsae W. D. Koch.)
C. Brts. resinous-glandular and glabrous: bracts of strobiles with the lateral lobes spreading and recurved (except in Nos. 20, 21), usually larger than the middle lobe.
D. Bark, white, usually flaky; petiole 1.5–3 cm. long.
E. Lvs. quite glabrous, rhombic-ovate, cuneate at base.
F. Lvs. long-acuminate: bark chalky- or ashy-white, rather close. 16. *B. populifolia*
FF. Lvs. acuminate: bark creamy-white, flaky....17. *B. pendula*
EE. Lvs. slightly pubescent beneath and with axillary tufts of hairs at least while young, triangular-ovate or ovate, usually truncate at base.
F. Bracts of strobiles finely pubescent, lateral lobes spreading.
G. Lvs. bright green, usually truncate or subcordate....18. *B. japonica*
GG. Lvs. dull green above, usually rounded or truncate at base. 19. *B. coerulea-grandis*
FF. Bracts of strobiles glabrous, but ciliate, lateral lobes ascending, shorter than the middle lobe....20. *B. alaskana*
DD. Bark close, brown: petioles 5–15 mm. long; lvs. 3–5 cm. long....21. *B. fontinalis*
CC. Brts. not or sparingly glandular, pubescent, sometimes glabrous: bracts of strobiles with the lateral lobes ascending, rarely spreading, and shorter than the middle lobe.
D. Wing of fr. as broad or broader than nutlet: bark usually white, sometimes brown.
E. Lvs. usually truncate or subcordate at base, 5–10 cm. long: strobiles 3–5 cm. long....22. *B. papyrifera*
EE. Lvs. usually cuneate at base, 3–6 cm. long: strobiles 2.5–3 cm. long. 23. *B. pubescens*
DD. Wings of fr. ½ as broad as nutlet, rarely as broad: bark brown, flaky: brts. glandular and pubescent: strobiles 2–2.5 cm. long....24. *B. davurica*
BB. Wings of fr. much narrower than nutlet: shrubs: lvs. small, 0.5–3 cm. long, with 2–5 pairs of veins. (Sect. 4. Humiles W. D. Koch.)
C. Brts. pubescent with long hairs: lvs. 1–3 cm. long.
D. Lvs. glabrous, acute: brts. glandular and pubescent....25. *B. humilis*
DD. Lvs. more or less pubescent at least when young.
E. Brts. glandless, densely pubescent: lvs. obtuse....26. *B. pumila*
EE. Brts. sparingly glandular and pubescent: lvs. acute or acutish. 27. *B. glandulifera*
CC. Brts. glabrous or minutely puberulous: lvs. rounded at apex, glabrous.
D. Brts. densely glandular: lvs. 8–25 mm. long....28. *B. glandulosa*
DD. Brts. glandless: lvs. 5–15 mm. across, suborbicular....29. *B. nana*

1. **B. Maximowicziàna** Reg. Tree to 30 m.; bark gray or orange-gray, peeling off in papery flakes; brts. dark reddish brown, glabrous: lvs. broad-ovate, acuminate, deeply cordate at base, 8–14 cm. long, doubly serrate, pubescent on young trees, nearly glabrous on old trees, with 10–12 pairs of veins; petiole 2.5–3.5 cm. long, glabrous or pubescent: strobiles 2–4 in a raceme, 1.5–7 cm. long, cylindric, nodding; bracts with ascending lateral lobes shorter than the middle lobe. B.M.8337(c). S.I.1:t.23(c). E.P.IV. 61:90. (*B. Maximowiczii* Reg., not Rupr., *B. candelae* Koidz.) Japan. Intr. 1888. Zone V.—Very handsome vigorously growing tree with large lvs.

2. **B. luminifera** Winkl. Tree to 20 m.; bark of old trunks dull yellowish gray, not exfoliating; brts. brown: lvs. ovate, acuminate, subcordate or rounded at base, 6–12 cm. long, sharply and unequally serrate with acuminate teeth, tomentulose or nearly glabrous beneath, with 10–13 pairs of veins; petiole 1–2.5 cm. long: strobiles solitary, 3.5–11 cm. long; bracts with the middle lobe much longer than the reduced lateral lobes. E.P.IV.61:92. Gn.89:698(h). (*B. Wilsoniana* Schneid., *B. hupehensis* Schneid., *B. alnoides* var. *pyrifolia* Burk., partly.) C. and W. China. Intr. 1901. Zone VI?—Ornamental tree with handsome large lvs.

A related species is **B. alnoides** Hamilt. Tree to 20 m.; bark brown; young brts. short-pubescent or nearly glabrous: lvs. ovate-oblong, 6–14 cm. long, rounded or cuneate at base, with appressed teeth, nearly glabrous: strobiles several, 3–9 cm. long. E.P.IV.61:90.f.22a-c. (*B. acuminata* Wall.) Himal., S. W. China.

Intr. 1901. Zone VII?—The closely related **B. cylindrostáchya** Lindl. is probably not now in cult.; its brts. are tomentulose when young: lvs. rounded or subcordate at base, with less appressed teeth, tomentulose beneath. (*B. alnoides* var. *c.* Winkl.) Himal.

3. **B. Ermáni** Cham. Tree to 20 m.; bark grayish or reddish to nearly white, exfoliating in thin sheets; brts. usually glandular; older brs. orange-colored: lvs. triangular-ovate, 5–10 cm. long, acuminate, truncate or subcordate at base, unequally coarsely serrate, glabrous and usually glandular beneath or pubescent on the veins, with 7–11 pairs of veins: petiole 5–35 mm. long: strobiles erect, oblong, 2–3 cm. long; bracts with linear-oblong lobes, the middle one longer than the ascending lateral ones; wing nearly half as broad as nutlet. S.I.1:t.21(c). E.P.IV.61:63,f.18D–F. N.K.2:t.16. (*B. ulmifolia* Reg., not Sieb. & Zucc.) N. E. Asia, Japan. Cult. 1880. Zone V.—Var. **subcordàta** Koidz. Brts. less glandular: lvs. more often subcordate, often with 10–14 pairs of veins. Later in leafing than the type. (Var. *nipponica* Maxim.) N. E. Asia, Japan. Cult. 1903.—Ornamental tree with handsome foliage, early leafing.

4. **B. ùtilis** D. Don. Tree to 20 m.; dark brown, peeling off in thin flakes; brts. villous and glandular: lvs. ovate to ovate-oblong, 5–8 cm. long, acuminate, rounded to broad-cuneate at base, unequally serrate, subcoriaceous, with 10–14 pairs of veins impressed above, pubescent beneath, otherwise glabrous or slightly hairy; strobiles peduncled, cylindric, about 3 cm. long; bracts pubescent, with oblong lobes, the middle lobe dilated above and usually longer than the ascending lateral ones; wings of fr. about half as broad as nutlet. E.H.4:t.269,f.7. Brandis, Ind. Trees,622,f.191. (*B. Bhojpathra* Wall.) Himal. Cult. 1880. Zone VII?—Var. **Prâttii** Burk. Bark orange-brown to pale gray: lvs. pubescent below, chiefly on the midrib: bracts of strobiles ciliate; lateral lobes spreading, spatulate. W. China. Intr. 1908. Zone V.

A closely related species is **B. Jacquemontiàna** Spach. Bark white; brts. short-pubescent, slightly glandular: lvs. ovate, 5–7 cm. long, rounded or slightly cuneate at base, doubly serrate, glandular beneath and hairy on the veins, with 7–9 pairs of veins: strobiles on long pubescent stalks; bracts with linear middle lobe. E.H. 4:t.270,f.15. Jacquemont, Voy. 6:t.158. (*B. utilis* var. *J.* Henry.) W. Himal. Cult. 1880. Zone VII?

5. **B. albo-sinénsis** Burk. Tree to 30 m.; bark bright orange or orange-red, exfoliating; brts. glabrous, sometimes glandular: lvs. ovate to ovate-oblong, acuminate, rounded or sometimes truncate, rarely subcordate at base, doubly serrate and often slightly lobulate, 4–7 cm. long, dark yellow-green above, light green and glandular beneath, with 10–14 pairs of veins, like the midrib sparsely silky or nearly glabrous; petioles 5–15 mm. long, glabrous or sparingly silky; strobiles cylindric, pendulous, 3–4 cm. long; bracts ciliate, the middle lobe linear-oblong, much longer than the broad ascending lateral lobes. (*B. utilis* var. *sinensis* Winkl.) C. and W. China. Intr. 1910. Zone V.—Var. **septentrionàlis** Schneid. Bark dull orange to orange-brown; lvs. oblong-ovate, 5–9 cm. long, more densely silky on the veins beneath and with axillary tufts of hairs. W. China. Intr. 1908.—This species and its variety are handsome trees; particularly the bark is strikingly beautiful.

6. **B. Schmídtii** Reg. Tree to 30 m., with dark gray or nearly black bark broken into thick small plates; brts. pubescent and glandular, finally glabrous, brown; lvs. ovate, acuminate, rounded or broad-cuneate at base, unequally serrate, 4–8 cm. long, light green and resin-dotted beneath, with 9–10 pairs of veins pilose like the midrib; petioles 5–10 mm. long, pilose:

strobiles cylindric, upright, 2–3 cm. long; bracts with narrow ciliate lobes, the middle one much longer. S.I.1:t.23(c). N.K.2:t.19. N. E. Asia, Japan. Intr. 1896. Zone V.—Handsome tree.

7. **B. Medwedièwi** Reg. Tall tree; brts. rather stout, smooth, pilose while young; buds large, glutinous; lvs. ovate to elliptic or obovate, short-acuminate, usually rounded or sometimes subcordate at base, unequally or nearly doubly serrate, 6–12 cm. long, dark green above and sparingly appressed-pubescent or glabrous, light green below, with 8–11 pairs of veins impressed above, glabrous or pilose below: strobiles cylindric-oblong, 2.5–4 cm. long; bracts with linear-oblong lobes, the middle one nearly twice as long as the ascending lateral ones; wing of fr. about ¼ as broad as nutlet. Gt.36:383, f.95,1–4. S.L.122(h). Transcauc. Intr. 1897. Zone III or IV.—Very distinct on account of its large and broad lvs.

8. **B. costàta** Trautv. Tree to 30 m.; bark grayish brown, exfoliating in papery flakes; brts. glabrous or finely villous when young, brown: lvs. ovate to oblong-ovate, 5–8 cm. long, long-acuminate, rounded or rarely subcordate at base, finely and doubly serrate with acuminate teeth, firm, sometimes sparingly pubescent above, glandular beneath, with 10–16 pairs of veins pilose beneath at least when young; petiole 8–15 mm. long: strobiles ellipsoid, about 2 cm. long, short-stalked: middle lobe of bracts about twice as long as the ovate or obovate somewhat spreading lateral ones. S.H.1:f.53o-o[1], 54k-k[1]. (*B. ulmifolia* var. *c.* Reg., *B. ulmifolia* Dipp. partly, not Sieb. & Zucc.) N. E. Asia. Cult. 1880. Zone V.—Handsome graceful tree with rather small and narrow lvs.

9. **B. grössa** Sieb. & Zucc. Japanese Cherry B. Tree to 25 m.; bark dark gray or nearly black, smooth, fissured on old trees; brts. glabrous, with small scattered lenticels, usually yellow-brown at first, chestnut-brown later: lvs. ovate to oblong-ovate, 5–10 cm. long, acuminate, usually subcordate at base, rather coarsely doubly serrate, rather thin, glandular beneath, with 10–15 pairs of veins silky beneath; petiole 1–2.5 cm. long, silky: strobiles nearly sessile, ellipsoid, 1.8–2.5 cm. long; bracts ciliate; middle lobe narrow-oblong, longer than the ovate lateral ones; wings of the fr. often narrowed toward the base. S.I.1:t.22(c). T.M.8:t.6,f.16–19. (*B. carpinifolia* Sieb. & Zucc., *B. ulmifolia* Sieb. & Zucc.) Japan. Intr. 1896. Zone IV.—Ornamental tree very similar to *B. lenta.*

10. **B. lenta** L. Cherry B. Tree to 25 m.; bark dark reddish brown, close, fissured into thick plates on old trunks; young bark aromatic and of agreeable flavor; brts. slightly pilose when young, soon glabrous and red-brown: lvs. oblong-ovate, 6–12 cm. long, acuminate, usually cordate at base, sharply and doubly serrate, silky-pubescent below when young, with 9–12 pairs of veins; petiole 1.5–2.5 cm. long: strobiles nearly sessile, ovoid-oblong, 2–3.5 cm. long and less than 1.5 cm. thick; bracts about 4 mm. long, glabrous, with short lobes of nearly equal length; wings about as broad as nutlet. S.S.9:t.448. H.T.124, 125(b). Em.232,t(c). (*B. carpinifolia* Ehrh.—Sweet or Blue B.) Me. to Ala., w. to Ohio. Intr. 1759. Zone III.—Var. **laciniàta** Rehd. Lvs. deeply lobed. Spont. in Me. Not yet intr.—Handsome tree pyramidal while young, round-headed in age, attractive in spring with its long and slender pendulous catkins.

B. l. × *pumila* = *B. Jackii;* see under no. 26.

11. **B. lûtea** Michx. Yellow B. Tree to 30 m.; bark yellowish or silvery gray, separating into thin flakes, reddish brown on old trunks; young bark aromatic and somewhat bitter; brts. pilose: lvs. ovate to oblong-ovate, 8–12

cm. long, with long pale hairs on the veins above and below, nearly glabrous at maturity, at the end of vigorous shoots often pubescent below, with 9–11 pairs of veins; petiole slender, 1.5–2.5 cm. long: strobiles short-stalked or subsessile, 2–3 cm. long and 1.5–2 cm. thick; bracts 5–8 mm. long, pubescent with narrow ascending lobes, the middle lobe longer; wing slightly narrower than the nutlet. S.S.9:t.449. Em.235,t(c). H.T.126, 127(b). (*B. excelsa* Pursh, not Ait., *B. allegheniensis* Brit.—Gray B.) Nfd. to Man., s. on the high peaks to Ga. and Tenn. Cult. 1800. Zone III.—Var. **macrólepis** Fern. Bracts of strobiles 8–12 mm. long; fr. usually suborbicular. B.B.1:610,f.1500 and B.T.f.217, as *B. lutea*. Range of species.—Ornamental tree similar to the preceding, but not succeeding as well in warmer regions; a valuable timber tree.

B. l. × *pumila* = *B. Purpusii;* see under No. 26.

12. **B. globispìca** Shirai. Tree to 20 m.; bark nearly white, exfoliating; brts. yellowish gray or grayish brown with prominent lenticels: lvs. orbicular-ovate or broad-ovate, 4–7 cm. long, short-acuminate, usually broad-cuneate or nearly rounded at base, sharply and coarsely unequally serrate, with about 10 pairs of veins pilose beneath like the midrib; petiole 5–15 mm. long, pilose: strobiles globose-ovoid, 2.5–3.5 cm. long; bracts with linear ciliate lobes. S.I.1:t.21(c). E.P.IV.61:68,f.19D–F. C. Japan. Intr. 1896. Zone V.

13. **B. Potanìni** Batal. Shrub to 3 m., with often prostrate brs.; brts. densely villous: lvs. ovate or oblong-ovate, acute or acutish, rounded or broad-cuneate at base, unequally and sharply serrate, 2–4 cm. long, glabrous above, rufous-pubescent chiefly on the nerves beneath, with 10–22 deeply impressed pairs of veins; petioles 4–8 mm. long, hairy: strobiles ellipsoid, about 2 cm. long; bracts ciliate, with obtusish suberect lateral lobes about half as long as the middle lobe; nutlets with narrow wings. (*B. Wilsonii* Bean.) W. China. Intr. 1908. Zone VI?—A very distinct shrubby birch easily recognized by its small acutish lvs. with numerous deeply impressed veins.

A closely related species is **B. Delavaỳi** Franch. Small tree or shrub: lvs. ovate or elliptic-ovate, 2–4 cm. long, acute or obtuse, glabrous except whitish hairs on the nerves beneath, with 10–14 pairs of veins; bracts of strobiles long-ciliate, lateral lobes acute, more spreading. E.P.IV.61:f.19m. W. China. Intr. 1910. Zone V.

14. **B. chinénsis** Maxim. Shrub or small tree with grayish bark; brts. villous while young, later brown: lvs. ovate, acute, rounded at the base, unequally serrate with mucronulate teeth, 2–5, rarely 6 cm. long; pilose beneath along the midrib and base of veins, with 8–10 pairs of veins; petiole 4–8 mm. long: strobiles ellipsoid, 1.5–2 cm. long; bracts with lanceolate, acute ciliate lobes, the lateral ones 2–3 times shorter, sometimes reduced; nutlets with very narrow wing. E.P.IV.61:f.68G–L. N.K.2,t.20. (*B. exalata* S. Moore.) N. E. Asia, N. China. Intr. 1906. Zone V.

Into this affinity seems to belong **B. Raddeàna** Trautv. Tree with densely villous and sparingly glandular brts.: lvs. ovate, rounded at base, 3–4.5 cm. long, pubescent along the veins beneath, with 6–7 pairs of not impressed veins; petioles 1–1.5 cm. long: strobiles ellipsoid; wings about as broad as nutlet. .Gt.36:385,f.95,5–11. S.H.2:f.554d. Cauc. Intr. ?

15. **B. nígra** L. River B. Tree to 30 m.; bark reddish brown or silvery gray on younger brs., exfoliating in papery flakes; brts. pubescent: lvs. rhombic-ovate, acute, doubly serrate, 3–8 cm. long, dark green above, whitish below and pubescent when young, finally only on the nerves, with 7–9 slightly impressed pairs of veins; strobiles oblong-cylindric, 2.5–3.5 cm. long;

bracts pubescent, with upright, linear-oblong, nearly equal lobes; wing ½ or nearly as broad as nutlet. S.S.9:t.452. G.F.2:593(h). Gn.55:161(h). H.T.122, 123(b). (*B. rubra* Michx.—Red B.) Mass. to Fla., w. to Minn. and Kan.—Graceful tree with an ovoid head and slender brts., remarkable for its torn and ragged bark; it likes moist sandy soil.

A related species is **B. corylifòlia** Reg. Tree to 20 m.; bark pale gray or nearly white; brts. glabrous or nearly so: lvs. elliptic to obovate, 4–6 cm. long, glaucescent below and silky on the nerves, with 10–14 impressed pairs of veins: strobiles subcylindric; bracts pubescent, with narrow upright lobes; nutlet with narrow wings. S.I.2:t.14(c). E.P.IV.61:60. C. Japan. Intr. ?

16. **B. populifòlia** Ait. Gray B. Small tree to 10 m. with usually ascending stem; bark chalky or ashy white, rather close; brts. densely glandular: lvs. triangular-ovate or deltoid, 6–8 cm. long, long-acuminate, truncate at base, coarsely and doubly serrate, glutinous when young, lustrous above; petiole 1.5–3 cm. long, slender: strobiles slender-stalked, cylindric, 1.5–3 cm. long; bracts spreading, puberulent. S.S.9:t.450. H.T.118, 119(b). B.T.248(h). G.C.III.60:302(h). (*B. alba* var. *p.* Spach.—White B.) N. S. and Ont. to Del. Intr. 1750. Zone IV.—Var. **laciniàta** Loud. Lvs. pinnately lobed.—Var. **purpúrea** Ellw. & Barry. Lvs. purple when young, green at length.—Var. **péndula** Loud. Brs. pendulous.—A small and graceful but short-lived tree; suited for dry and poor and also for boggy soil; useful as nurse for more valuable trees.

B. p. × *papyrifera* has been observed in Mass. G.F.8:356.

17. **B. péndula** Roth. European B. Tree to 20 m.; bark white, exfoliating; brs. usually pendulous, at least in older trees; brts. resinous-glandular: lvs. rhombic-ovate, 3–7 cm. long, acuminate, usually cuneate at base, sometimes truncate, doubly serrate, glutinous when young, glabrous; petiole slender, 2–3 cm. long: strobiles cylindric, 2–3 cm. long, slender-stalked; bracts puberulous or glabrous. H.W.2:20(h),t.15(c). E.P.IV.61:76. B.C.1:498(h). (*B. verrucosa* Ehrh., *B. alba* L. partly.) Eu., Asia Minor. Long cult. Zone II.—Var. **purpúrea** Schneid. Lvs. purple. R.B.4:t.185(c). (*B. alba atropurpurea* Lauche.)—Var. **dalecárlica** Schneid. Lvs. deeply lobed, with irregularly serrate acuminate lobes. R.I.12:t.627,f.1289(c). (*B. laciniata* Wahlb.)—Var. **trístis** Schneid. Form with slender pendulous brs. forming a round regular head.—Var. **grácilis** Rehd. Habit like that of the preceding form but with laciniate lvs. smaller and more finely dissected than in var. *dalecarlica*. (*B. alba laciniata gracilis pendula* Hort., *B. a. elegans laciniata* Hort.)—Var. **Yoùngii** Schneid. Primary brs. spreading and recurving forming an irregular head; brts. very slender and pendulous. F.1873:60(h). R.H.1869:136(h). Gn.84:93(h). (f. *elegans* Winkl., *B. alba pendula Youngii* Th. Moore.)—Var. **fastigiàta** K. Koch. With straight upright brs. forming a columnar head: lvs. very dark green. G.C.III.41:151(h). M.G.16:169(h). (Var. *pyramidalis* Dipp., *B. alba f.* Carr.)—Var. **viscòsa** Rehd. Bushy small tree; young growth very viscid: lvs. crowded, 2–3.5 cm. long, coarsely doubly serrate or lobulate; petiole 1–1.5 cm. long. (*B. verrucosa* var. *dentata viscosa* Bean.)—Of the several geographical vars. the best known is Var. **oycoviénsis** Schneid. Shrubby, with very glandular brts.: lvs. rhombic, much smaller. S.H.1:f.60s. (*B. o.* Bess.)—A handsome but comparatively short-lived tree. Of its vars. var. *dalecarlica* is most often planted; it forms a very graceful tree.

B. p. × *papyrifera* = **B. Koèhnei** Schneid. Somewhat doubtful. Cult. 1905.—*B. p.* × *pubescens* = **B. auràta** Bechst. Spont. in Eu.—*B. p.* × *nana* = *B. fennica;* see under No. 29.

18. **B. japónica** Sieb. Japanese White B. Tree to 20 m.; bark white; brts. usually resinous-glandular: lvs. deltoid-ovate, 5–7 cm. long, acuminate, truncate or sometimes subcordate at base, simply or doubly dentate-serrate, puberulous below or glabrous, usually with axillary tufts of hairs; petiole 1.5–2 cm. long: strobiles cylindric; middle lobe of bracts shorter than lateral lobes; wing broader than nutlet. C.C.77. S.H.1:f.62q. Gn.89:719(h). (*B. alba* var. *j.* Miq., *B. pendula* var. *Tauschii* Rehd., *B. latifolia* Komar., not Tausch.) Japan, N. E. Asia, N. China. Intr. 1902. Zone IV.—Var. **kamtschática** Winkl. Lvs. usually thinner, truncate or broad-cuneate at base, more sharply serrate and lobulate, rarely slightly pilose on the veins beneath and slightly bearded. S.I.1:t.11(c). Bull. Soc. Nat. Mosc.38,2:t.7, f.16–20. (*B. alba* var. *k. Reg.*) N. E. Asia, Japan. Cult. 1907.—Var. **mandshùrica** Winkl. Lvs. often broad-cuneate at base, quite glabrous below. N.K.2:t.13. (*B. alba* subsp. *m.* Reg., *B. m.* Nakai.) N. E. Asia. Intr.?—Var. **szechuànica** Schneid. Tree with wide-spreading brs.: lvs. often rhombic-ovate and cuneate at base, unequally dentate-serrate, not lobulate, densely glandular-punctate beneath and glabrous or very slightly pilose, dark dull green above. W. China. Intr. 1872 and 1908. Zone V.—Handsome tree with larger and broader lvs. than the two preceding species and remaining dark green until late in autumn.

19. **B. coerúlea-grándis** Blanchard. Tree to 10 m.; brts. glabrous; slightly resinous-glandular: lvs. ovate or triangular-ovate, acuminate, usually rounded or truncate at base, 6–8 cm. long, sharply and usually doubly serrate, bluish green above, yellowish green beneath and slightly hairy on the veins at first, soon glabrous or nearly so; petioles 1.5–2.5 cm. long; strobiles cylindric, pubescent, 2.5–3 cm. long and 8–10 mm. thick; lateral lobes of bracts spreading, as long or slightly longer than middle lobe. S.M.211a. (*B. coerulea* var. *Blanchardi* Sarg.) N. S. to Que., Vt. and N. H. Intr. 1905. Zone II?

B. c. × *populifolia* = **B. coerúlea** Blanchard. Lvs. usually broad-cuneate at base, slightly smaller: strobiles to 3.5 cm. long, slenderer. S.M.211. N. S. to Vt. Intr. 1905.

20. **B. neoalaskàna** Sarg. Tree to 25 m.; bark reddish brown or dull white, exfoliating; brts. densely resinous-glandular: lvs. triangular-ovate, 4–8 cm. long, acuminate, usually truncate at base, coarsely unequally serrate, slightly hairy beneath when young; petiole 1.5–3 cm. long: strobiles cylindric, 3–3.5 cm. long; bracts glabrous or puberulent, the middle lobe small, acute, longer than the spreading or ascending rhombic lateral lobes. S.S.14:t.726. (*B. alascana* Sarg., not Lesquereux.) Sask. to the Yukon. Intr. 1905. Zone I.

21. **B. fontinàlis** Sarg. Small shrubby tree, usually forming clumps, occasionally to 12 m.; bark close, reddish brown; brts. slender, densely resinous-glandular: lvs. broad-ovate, 2–4 cm. long, acute, usually rounded at base, sharply and often doubly serrate, bright green, glandular-dotted beneath, with 3–4 pairs of veins; strobiles 2–3 cm. long, 5–10 mm. thick; bracts pubescent, the lateral lobes ascending, shorter than the narrow middle lobe, all acute. S.S.9:t.453. N.S.1:t.8(c). (*B. occidentalis* Hook., in part, *B. rhombifolia* Nutt., not Tausch.) Alaska to Ore. and through the Rocky Mts. to Color. Intr. 1874.—A graceful tree with slender spreading and pendulous brs.; in cult. usually shrubby and upright while young.—Var. **Piperi** Sarg. Small tree: lvs. ovate or elliptic, 5–6 cm. long, usually broad-cuneate at base, pubescent on the veins beneath when young: strobiles cylindric, 3–5 cm. long; lateral lobes of bracts broad and spreading, auricled at base. S.M.219. (*B. P.* Brit.) Wash., Mont. Intr. 1903. Zone V.

Probably only a form of no. 21 is **B. utahénsis** Brit. which differs chiefly in the thicker somewhat larger lvs. and stouter strobiles; bracts with short and spreading lateral lobes usually auricled at base. B.T.254. Utah. Intr. ?

22. **B. papyrífera** Marsh. CANOE B. Tree to 30 or occasionally 40 m.; bark white, exfoliating; brts. pubescent when young and often slightly glandular: lvs. ovate to narrow-ovate, 4–10 cm. long, acuminate, cuneate or rounded at base, coarsely and usually doubly serrate, glabrous above, pubescent on the nerves beneath or nearly glabrous; petiole stout, 1.5–3 cm. long, pubescent: strobiles cylindric, 3–5 cm. long, slender-stalked, usually pendulous; bracts pubescent, with suberect or spreading lateral lobes slightly shorter than the middle lobe. S.S.9:t.451. Em.238,t. H.T.121(b). W.A.26,t(h). M.G.29:145(h). (*B. papyracea* Ait., *B. latifolia* Tausch.—Paper B., White B.) Lab. to B. C. and Wash., s. to Pa. and Mich., Neb. and Mont. Intr. 1750. Zone I.—Var. **occidentàlis** Sarg. Large tree to 40 m.; bark orange to dark brown, sometimes nearly white: lvs. ovate or broad-ovate, acute or acuminate, rounded or truncate at base, doubly serrate, bright or dark green, rather thin: strobiles 3–4 cm. long; lateral lobes of bracts spreading, much shorter than the middle lobe. S.S.14:t.725. A.I.1:512. (Var. *Lyalliana* Henry, *B. Lyalliana* Koehne, *B. o.* Hook., in part.) B. C. and Wash. to Mont. Intr. about 1885.—Var. **kenâica** Henry. Bark usually white, tinged with orange and brown; brts. minutely pubescent and slightly or not glandular: lvs. usually cuneate at base, about 5 cm. long: strobiles shorter; bracts glabrous, ciliate, middle lobe not much longer than the lateral rounded lobes. S.S.14:t.723. (*B. k.* Evans.) Coast of Alaska. Intr. 1897.—Var. **subcordàta** Sarg. Small tree with silvery gray purple-tinged bark; brts. glabrous or puberulent, rarely slightly glandular: lvs. ovate or broad-ovate, acute, rounded to cordate at base, glabrous, rarely slightly pubescent near base beneath, unequally dentate-serrate; bracts of strobiles pubescent and ciliate, middle lobe narrow, slightly longer than the broad spreading or ascending lateral lobes. Bull. Torr. Bot. Club,36:436. (*B. s.* Rydb.) B. C. and Alb. to Idaho and Mont. Intr. 1918.—Var. **cordifòlia** Fern. Small tree with usually white bark, sometimes shrubby; brts. pubescent while young: lvs. broad-ovate, subcordate at base, doubly serrate, pilose on the veins beneath. S.S.14:t.724. (*B. c.* Reg.) Lab. to Minn. Intr. 1876.—Var. **mínor** Wats. & Coult. Shrub or low bushy tree: lvs. elliptic-ovate or ovate, truncate or broad-cuneate at base, 1.5–4 cm. long, glabrous beneath, glutinous: strobiles 1.5–3 cm. long, 5–10 mm. thick. Am. Jour. Sci. 14:t.5,f.9–12. Lab. to N. H. and Minn. Intr. 1904.—Handsome tree, often planted for ornament in the N. E. States; the vars. occasionally seen in collections.

B. p. × *populifolia;* see under No. 16.—*B. p.* × *pendula* = *B. Koehnei;* see under No. 17.—*B. p.* × *pumila* = ? *B. excelsa* Ait.; see under No. 26.—*B. p.* × *glandulifera* = *B. Sandbergii* Brit.; see under No. 27.

23. **B. pubéscens** Ehrh. Tree to 20 m.; with usually ascending or spreading brs.; bark white, exfoliating, dark and rough at base of old trunks; young brts. densely pubescent, glandless: lvs. rhombic-ovate or ovate, 3–5 cm. long, acute, truncate or cuneate at base, usually unequally doubly serrate, pubescent beneath, at least while young, often with axillary tufts of hairs; petiole pubescent, often finally glabrous, 1–2.5 cm. long; strobiles cylindric, 2.5–3 cm. long; bracts puberulous, lateral lobes suberect to recurved, slightly shorter than the middle lobe; wing as broad or twice as broad as nutlet. R.I.12:t.625(c). H.W.2:24,25(h). (*B. alba* L. in part, *B. odorata* Bechst.) N. and C. Eu. to Siberia. Cult. 1789. Zone I. A very variable species with many geographical vars. and forms which are scarcely cult. in this country.

except perhaps var. **urticifòlia** Schelle. Lvs. coarsely doubly serrate or lobulate, dark green and slightly pubescent above, more densely beneath: wing much narrower than nutlet. S.H.1:f.64m-m⁴. (*B. u.* Reg., *B. alba* var. *u.* Loud.) Orig. unknown; said to have been found wild in Sweden. Cult. 1836.

B. p. × *nana* = *B. intermedia;* see under No. 29.

24. **B. davùrica** Pall. Tree to 20 m.; bark purplish brown, exfoliating in thin and small flakes; brts. glandular and pubescent: lvs. rhombic-ovate or narrow-ovate, 4–8 cm. long, acute or acuminate, cuneate, unequally dentate-serrate, gland-dotted beneath, with 6–8 pairs of veins pubescent on both sides, finally glabrescent above; petiole 5–15 mm. long, slightly pilose: strobiles 2–2.5 cm. long: bracts glabrous, lustrous, firm, middle lobe triangular, about as long as the lateral rounded and spreading lobes; wing of fr. about half as broad as nutlet. S.H.1:f.60p. N.K.2:t.14. Gn.89:719(h). (*B. Maximowiczii* Rupr., *B. Maackii* Rupr., *B. wutaica* Mayr.) N. E. Asia, Japan. Intr. 1883. Zone V or IV?—Tree with wide-spreading brs. and peculiar bark similar to that of the Red Birch.

25. **B. húmilis** Schrank. Shrub to 3 m.; brts. resinous-glandular and hairy: lvs. ovate or elliptic, rarely obovate, 1.5–3 cm. long, acute or acutish, cuneate, rarely rounded at base and apex, irregularly dentate-serrate, glabrous and green on both sides, with 4–5 pairs of veins; petiole 1–4 mm. long: strobiles upright, oblong, 5–15 mm. long; bracts ciliate, middle lobe usually thinner and larger than the lateral lobes; wing about half as broad as nutlet. R.I.12:f.1279(c). H.W.2:f.122a-d. S.H.1:f.55a-e. Eu., N. Asia to Altai Mts. Intr. 1818. Zone I.—Small-leaved shrub, rarely cult.

Closely related species are: **B. fruticòsa** Pall. Brts. often less glandular: lvs. 2–5 cm. long, more distinctly serrate with finer serrations, with 5–6 pairs of veins, slightly pubescent on the midrib beneath: wing ½–¾ as broad as nutlet. S.H. 1:f.56d-e,57b-b¹. N.K.2:t.15. (*B. Gmelini* Bge.) N. E. Asia, N. China. Intr. Cult. 1876. Zone V.—**B. Middendôrffii** Trautv. & Mey. Brts. resinous-glandular and finely pubescent when young or quite glabrous and smooth: lvs. orbicular-ovate or broad-ovate, 2–4 cm. long, rounded or acutish at apex, usually rounded at base, coarsely serrate, pale yellow green beneath; strobiles 1.5–2 cm. long; wing about as broad as nutlet. Middendorff, Reise,I.1:t.21. N. E. Asia. Cult. 1904.

26. **B. pùmila** L. Low B. Shrub to 5 m.; brts. densely tomentose when young, not glandular: lvs. suborbicular to broad-elliptic or obovate, 1–3 cm. long, obtuse or acutish, rounded or broad-cuneate at base, coarsely crenate-dentate, usually densely pubescent beneath while young and grayish white and reticulate-veined, often becoming quite glabrous, with 4–6 pairs of veins: strobiles cylindric-oblong, upright, stalked, 1.5–2.5 cm. long; bracts pubescent, lateral lobes spreading, shorter than the middle lobe; wing about half as broad as nutlet. B.B.1:511. E.P.IV.61:f.20g-m. Nfd. to Assina., s. to N. J., Ohio and Minn. Intr. 1762. Zone I.

B. p. × *lenta* = **B. Jáckii** Schneid. Bark aromatic: lvs. 3–5 cm. long, glabrate, with about 7 pairs of veins: strobiles about 1.2 cm. thick. G.F.8:243. Cult. 1895. —*B. p.* × *lutea* = **B. Purpùsii** Schneid. Lvs. usually oblong-ovate, 3–5 cm. long, pubescent beneath, with 7–9 pairs of veins. S.H.1:f.58a-a¹. Cult. 1900.—? *B. p.* × *papyrifera* = **B. excélsa** Ait. A doubtful hybrid; perhaps a form of *B. pubescens* from which it chiefly differs in the shorter petioles 5–15 mm. long. N.D.3:t.52(c). W.D.95(c). Cult. 1789. Another hybrid between *B. p.* and *B. papyrifera* is **B. Borggreveâna** Zabel. S.H.1:f.59r²-r³.

27. **B. glandulífera** Butler. Shrub to 2 m.; brts. slender, reddish brown, slightly resinous-glandular and pilose: lvs. obovate or elliptic to suborbicular, 2–5 cm. long, usually acute, cuneate, serrate or crenate-serrate, pubescent on the veins beneath when young, reticulate and resin-dotted: strobiles 1.5–2 cm. long, cylindric; lateral lobes of bracts ascending, shorter than the obtuse

middle lobe. Bull. Torr. Bot. Club, 36:424,f.2. A.I.1:511. (*B. pumila* var. *g.* Reg.) Ont. and Mich. to B. C. Intr.?

A closely related species is **B. Hâllii** Howell. Brts. finely or velvety-pubescent and sparingly glandular: lvs. obovate, rounded at apex, cuneate, crenate-serrulate, bright green, glabrous and resin-dotted beneath: lobes of bracts obtuse, of about equal length, the lateral suberect. Bull. Torr. Bot. Club, 36:428,f.6. (*B. pumila* var. *fastigiata* Rehd.) Ore. to Alaska and Yukon. Intr. about 1898. Zone I.

28. **B. glandulòsa** Michx. Shrub to 2 m.; brts. resinous-glandular, glabrous: lvs. suborbicular to broad-elliptic or obovate, 8–25 mm. long, rounded at ends or broad-cuneate at base, crenate-dentate, pale and gland-dotted beneath, glabrous; petiole 3–8 mm. long: strobiles 1.5–2 cm. long; bracts with nearly equal lobes, the lateral suberect; nutlets with very narrow wings. B.B.1:510. Nfd. to Alaska, s. to N. Y., Mich., Colo. and Calif. Intr. 1880. Zone I.

29. **B. nàna** L. Low spreading much-branched shrub, to 0.5 m.; brts. velutinous, later often nearly glabrous, not glandular: lvs. orbicular to broad-obovate, rounded or truncate at apex, 5–15 mm. long, crenate, glutinous when young and slightly pubescent beneath; petiole very short: strobiles nearly sessile, 7–10 mm. long; bracts with rather narrow nearly equal lobes, the lateral ascending; nutlets with very narrow wings. R.I.12:f.1278(c). E.P.IV.61:f.20d-f. N. Asia, N. and C. Eu., Greenl., Alaska. Cult. 1789. Zone I.—Var. **Michaûxii** Reg. Lvs. cuneate-flabellate, deeply crenate: strobiles with oblong-lanceolate entire bracts or the lower ones 3-lobed. B.B. 1:612. E.P.IV.61:f.20a-c. (*B. M.* Spach.) Lab. Intr. ?

B. n. × *pubescens* = **B. intermèdia** Thomas. Shrub to 3 m.: lvs. suborbicular to ovate, 8–25 mm. long. S.H.1:f.58e-e^2,59o-p^1. (*B. alpestris* Fries.) Spont. in Eu. Cult. 1895.—*B. n.* × *pendula* = **B. fénnica** Doerfl. Similar to *B. intermedia*, but brts. glandular. S.H.1:f.58g-g^4,59l-n. Spont. in Eu. Cult. ?

2. **ALNUS** Mill. Alder. Deciduous trees or shrubs; buds stalked and with 2 or 3 subequal scales or sessile and with imbricate scales: lvs. usually serrate or dentate: staminate catkins elongated, each bract with 3 fls., each fl. with a 4-parted calyx and 4, rarely 1–3, undivided stamens; pistillate catkins short, each bract with 2 fls. without calyx; the bractlets adnate to the bract; fr. a minute compressed, usually narrowly winged nutlet, in pairs in the axils of woody, 5-lobed or truncate persistent scales forming an ellipsoid or ovoid strobile. The fls. appear before or with the lvs.; the fr. ripens in autumn. (The ancient Latin name of the alder.)—About 30 species in the northern hemisphere, in America s. to Peru.—Ornamental trees or shrubs; some species valued as timber trees. Mostly moisture-loving and essentially plants of cool climates.

A. Buds sessile, with 2 or more unequal scales: pistillate catkins terminal enclosed during the winter in the bud: fr. with broad membranous wing: fls. with the lvs. (Subgen. Alnaster Endl.)
  B. Lvs. with 12–26 pairs of veins.
    C. Strobiles 1–2: lvs. with 12–18 pairs of veins: brts. grayish or yellowish brown. 1. *A. firma*
    CC. Strobiles 2–5, pendulous: lvs. with 18–26 pairs of veins: brts. dark red-brown. 2. *A. pendula*
  BB. Lvs. with 5–10 pairs of veins, glutinous when young.
    C. Lvs. not lobed, finely serrulate.
      D. Lvs. broad-cuneate or rounded at base, usually pilose on the midrib. . 3. *A. viridis*
      DD. Lvs. rounded or subcordate at base. . . . . 4. *A. crispa*
    CC. Lvs. distinctly lobulate, thin, glabrous. . . . . 5. *A. sinuata*
AA. Buds stipitate, with 2 or 3 subequal scales. (Subgen. Alnus Endl.)
  B. Aments appearing in autumn at the end of the brts.
    C. Lvs. plicate in bud, usually lobulate, with straight veins: pistillate catkins several from each bud.
      D. Lvs. green beneath, glutinous while young.
        E. Lvs. serrulate not or scarcely lobulate: strobiles partly sessile. . . 6. *A. rugosa*
        EE. Lvs. lobulate, dentate or denticulate.

FF. Strobiles all stalked: lvs. obtuse or acutish ..... 7. *A. glutinosa*
FF. Upper strobiles sessile: lvs. acute or acuminate ..... 8. *A. tenuifolia*
DD. Lvs. glaucous beneath or glaucescent.
E. Lvs. with revolute margin; petioles and veins orange-colored: brts. glabrous. 9. *A. rubra*
EE. Lvs. not revolute on the margin.
F. Lvs. strongly lobed, 8–14 cm. long, hirsute on the midrib beneath or glabrous ..... 10. *A. hirsuta*
FF. Lvs. not strongly lobed except on shoots, usually smaller, tomentose or nearly glabrous beneath ..... 11. *A. incana*
CC. Leaves not plicate in bud, irregularly and rather remotely serrate, not lobulate; veins arching: pistillate catkins solitary or 2–3 from each bud.
D. Fls. opening in spring.
E. Lvs. rounded to cordate at base.
F. Lvs. suborbicular to ovate, cordate at base, appressed-crenate-serrate: brts. and lvs. glabrous ..... 12. *A. cordata*
FF. Lvs. ovate to oblong-ovate, coarsely and unequally serrate: brts. and lvs. pubescent ..... 13. *A. subcordata*
EE. Lvs. cuneate, rarely nearly rounded at base, oblong-ovate to oblong-lanceolate. 14. *A. japonica*
DD. Fls. opening in autumn: lvs. elliptic or obovate to oblong, cuneate at base. 15. *A. maritima*
BB. Aments of both sexes solitary in the axils of lvs.; pistillate catkins long-stalked; staminate fls. naked. (Subgen. CREMASTOGYNE Winkl.) ..... 16. *A. cremastogyne*

1. **A. fírma** Sieb. & Zucc. Shrub or small tree to 3 m.; brts. glabrous; lvs. ovate-oblong, 5–12 cm. long, acuminate, usually rounded at base, sharply and irregularly serrate, pubescent on the veins beneath; strobiles about 2 cm. long, on stalks to 2.5 cm. long. S.I.2:t.12(c). (*A. Sieboldiana* Matsum.) Japan. Not yet intr. and probably tenderer than the var.—Var. **hirtélla** Franch. & Sav. Shrub or tree to 10 m.; brts. pubescent: lvs. ovate-oblong to ovate-lanceolate. E.H.4:t.268,f.2. S.H.1:f.66n–n¹,67b–c¹. G.C.III.75:255. (*A. yasha* Matsum., *A. firma* var. *yasha* Winkl.) Japan. Intr. 1892. Zone V.—Ornamental shrub or small tree with handsome foliage remaining green until late in autumn. Often confused with the following species and cult. as *A. multinervis*.

2. **A. péndula** Matsum. Shrub or small tree to 8 m.; young brts. pubescent, soon glabrous: lvs. oblong-lanceolate, 5–12 cm. long, acuminate, irregularly and sharply serrate, pubescent on the veins beneath, finally nearly glabrous: strobiles 8–15 mm. long, slender-stalked, in nodding racemes 3–6 cm. long. S.I.2:t.12(c). S.H.1:f.66o,67d–d². (*A. firma* var. *multinervis* Reg., *A. m.* Callier.) Japan. Intr. 1862. Zone V.—Similar to the preceding species, but smaller and more graceful.

3. **A. víridis** DC. EUROPEAN GREEN A. Shrub to 2 m.; brts. pubescent when young, finally gray or red-brown: lvs. ovate or elliptic, sometimes roundish ovate, 2.5–6 cm. long, acute, usually broad-cuneate, pale green and glabrous beneath or pubescent on the veins, rarely on the whole under side: pistillate catkins on glabrous or puberulous stalks: strobiles about 1 cm. long, slender-stalked, racemose. H.W.2:t.14(c). L.B.12:1141(c). R.I.12:t. 678(c). (*A. Alnobetula* Hartig, *A. ovata* Lodd.) Mts. of Eu. Intr. 1820. Zone III. — Smaller in every part than the following species and not as handsome.

4. **A. crispa** Pursh. AMERICAN GREEN A. Shrub to 3 m., sometimes decumbent; young brts. glabrous or sparingly pubescent: lvs. ovate or broad-elliptic, 3–8 cm. long, acute, usually rounded or slightly subcordate at base, finely and closely serrulate or biserrulate, glabrous beneath or slightly pubescent on the veins, glutinous while young: stalks of pistillate catkins pubescent; filaments longer than perianth; anther-cells connate their whole length: strobiles 3–6, racemose, 1–1.5 cm. long, on stalks 5–15 mm. long. B.B.1:612. (*A. Mitchelliana* M. A. Curt., *A. viridis* var. *crispa* Winkl., *A. viridis* of

Am. auth.) Lab. to N. C. in the mts. Intr. 1782. Zone I.—Shrub with bright green lvs. exhaling an aromatic fragrance when young; prefers cool and moist situations.—Var. **móllis** Fern. Young brts. and lvs. beneath pubescent; lvs. usually larger; strobiles to 2 cm. long. G.C.III.77:41. (*A. m.* Fern.) Nfd. to Lake Winnipeg, s. to Mass. Intr. 1897.

5. **A. sinuàta** Rydb. Shrub or small tree to 12 m.; brts. glandular and puberulous when young: lvs. ovate, 6–12 cm. long, acute, rounded to broad-cuneate at base, usually lobulate, sharply serrate, light green and glabrous beneath or villous along the midrib; anther-cells free at ends and spreading; filaments shorter than perianth: strobiles about 1.5 cm. long, 3–6 in sometimes leafy racemes, on slender peduncles to 2 cm. long. S.S.14:t.727. (*A. sitchensis* Sarg., *A. viridis* var. *stenophylla* Winkl.) Alaska to n. Calif. Intr. 1903. Zone I.—Shrub with rather large bright green lvs.; like the preceding species it prefers cool and moist situations.

Closely related species are: **A. fruticòsa** Rupr. Lvs. ovate, sometimes broad-cuneate at base, glabrous beneath: filaments shorter than perianth. S.H.1:f.66h. (*A. viridis* var. *sibirica* Reg.) N. E. Asia. Cult. 1888. Zone IV.—**A. Maximowíczii** Callier. Lvs. abruptly short-acuminate, truncate or cordate at base; anther-cells free at base and apex. S.H.1:f.66k. M.D.1918:t.9 (*A. viridis* var. *sibirica* Reg. in part.) Japan. Intr. 1914. Zone V.

6. **A. rugòsa** Spreng. Smooth A. Shrub or small tree to 8 m.; brts. nearly glabrous or pubescent, rarely densely villous; stipules oval: lvs. elliptic to obovate, 5–10 cm. long, acute or obtuse, cuneate, rarely elliptic-ovate and rounded at base, finely and nearly regularly serrulate, green beneath and glabrous or pubescent on the veins, rarely pubescent all over: strobiles 4–10, the upper sessile, the lower short-stalked, ovoid, 1–1.5 cm. long; nutlet ovate. Add.7:t.237(c). Em.248,t(c). B.B.1:613. (*A. serrulata* Willd.)—A tall rather coarse shrub adapted for planting along water-courses and banks of ponds. Me. to Minn., s. to Fla. and Tex. Cult. 1769. Zone IV.

A. r. × *incana* = **A. Aschersoniàna** Callier. Differs chiefly in the more pointed, rather coarsely serrate lvs. usually yellowish pubescent beneath and often slightly glaucous. S.H.1:f.72b-c. Occasionally among the parents, first observed in Eu.—*A. r.* × *glutinosa* = **A. silesíaca** Fick. S.H.1:f.69r-r¹. Observed in Eu.

7. **A. glutinòsa** Gaertn. Black A. Tree to 25 m.; young growth very glutinous; brts. usually glabrous; stipules ovate to lanceolate; lvs. oval or obovate to suborbicular, 4–10 cm. long, rounded or emarginate at apex, usually broad-cuneate, coarsely and doubly dentate, usually nearly glabrous except axillary tufts of hairs beneath, with 5–6 pairs of veins: strobiles 3–5, distinctly stalked. H.W.2:12(h),t.12(c). H.T.130. G.C.II.2:294, 295(h). E.H.4:t.252–3(h). (*A. vulgaris* Hill, *A. rotundifolia* Mill., *A. communis* Desf.) Eu. to Cauc. and Siberia, N. Afr.; occasionally escaped in N. E. Am. Long cult.—Var. **aùrea** Versch. Lvs. yellow. I.H.13:t.490(c). Cult. 1866.—Var. **laciniàta** Willd. Lvs. deeply and regularly lobed about halfway to the middle, with ovate to lanceolate, dentate or nearly entire lobes. E.H.4:t.268,f.7. S.H.f.69o–o¹. Cult. 1750.—Var. **imperiàlis** Kirchn. Similar to the preceding, but lvs. smaller, more deeply lobed, with linear nearly entire lobes. I.H.6:97,t. Gt.37:585. Cult. 1860.—Var. **quercifòlia** Loud. Lvs. deeply lobed, with irregular ovate lobes. S.H.1:f.69m.—Var. **sorbifòlia** Dipp. Similar to the preceding, but lvs. smaller with broader partly overlapping lobes. S.H.1f.69n. —Var. **incìsa** Willd. Lvs. small, deeply lobed or pinnate, with broad rounded dentate lobes. E.H.4:t.268,f.10. S.H.1:f.69p–p′. (Var. *oxyacanthifolia* Loud.) Cult. 1800.—Var. **rubrinérvia** Dipp. Lvs. lustrous, dark green, with red veins and petioles; a very handsome form of vigorous growth and broad-

pyramidal habit. Intr. about 1870.—Var. **pyramidàlis** Dipp. Habit narrow-pyramidal: lvs. dark green, rather short and broad. (Var. *pyramidalis Birkiana* Hort.) Cult. 1880.—Besides these forms the following geographical vars. are sometimes cult.: Var. **denticulàta** Ledeb. Lvs. broad-elliptic, obtuse or short-acute, denticulate, not or slightly lobed except on vigorous shoots. Eichwald, Pl. Nov. Casp. t.2. S.H.1:f.69l. Cauc., W. Asia, Italy, N. Afr. Intr. 1759?—Var. **barbàta** Ledeb. Lvs. ovate-oblong, denticulate, beneath like the petioles pubescent. (*A. b.* C. A. Mey.) Cauc. Cult. 1870.—Tree with an ovoid or oblong head and very dark foliage remaining green until late in autumn; growing well in swampy soil. Besides No. 10 silviculturally the most important Alder.

A. g. × *incana* = **A. hýbrida** A. Br. Not uncommon in Eu. with the parents. R.I.12:f.1292(c). S.H.1:f.69s–s′. (*A. pubescens* Tausch, not Sartorelli, *A. ambigua* Beck. *A. spuria* Callier.)—*A. g.* × *rugosa* = *A. silesiaca;* see under No. 6.—*A. g.* × *cordata* = *A. elliptica;* see under No. 12.

8. **A. tenuifòlia** Nutt. Tree, occasionally to 10 m.; brts. slightly pubescent at first, finally light brown or often red; buds red; stipules ovate to lanceolate: lvs. ovate to ovate-oblong, 4–10 cm. long, rounded or less often subcordate or broad-cuneate at base, slightly lobes with obtuse lobes and usually obtusely toothed, usually yellowish green, glabrous or slightly pubescent and light green or sometimes glaucescent beneath; petiole 1.5–2.5 cm. long: stamens 4: strobiles 3–9, ovoid-oblong, 1–1.5 cm. long, on peduncles 3–8 mm. long. S.S.9:t.455. (*A. incana* var. *virescens* S. Wats., *A. occidentalis* Dipp.) B. C. to L. Calif., e. to Sask., Colo. and N. Mex. Cult. 1880. Zone V.—Small shrubby tree with slender brs. forming an ovoid round-topped head. Its more n. form with larger more sharply toothed lvs. slightly glaucescent beneath has been distinguished as var. **occidentàlis** Callier (*A. o.* Dipp.) Intr. 1891.

Related species are: **A. rhombifòlia** Nutt. Tree to 25 m.: lvs. ovate to suborbicular, acute or obtuse, usually finely serrate, pubescent when young, later only below: stamens 2–3. S.S.9:t.456. Wash. to Idaho and S. Calif. Intr. about 1885. Zone V.—**A. oblongifòlia** Torr. Tree to 10 m.: lvs. oblong-ovate to ovate-lanceolate, 4–8 cm. long, usually acute, cuneate, sharply and usually doubly serrate, glabrous or puberulous below: stamens 2–3: strobiles 1.5–2.5 cm. long. S.S.9:t.457. N. Mex. and Ariz. to n. Mex. Intr ? Zone VIII?

9. **A. rúbra** Bong. Tree to 20 m.; bark light gray, nearly smooth; brts. tomentulose at first, soon glabrous, finally dark red; buds red, scurfy: lvs. ovate to oblong-ovate, 7–12 cm. long, acute, broad-cuneate or truncate at base, lobulate and crenate-serrate with slightly revolute margin, at maturity glabrous above, grayish green or glaucous beneath and glabrous or with short rusty pubescence, with 12–15 pairs of veins; petiole and nerves red or yellow: strobiles 6–8, ovoid to ovoid-oblong, 1.5–2.5 cm. long, on stout orange-colored stalks or sessile. N.S.1:t.9(c). S.S.9:t.454. (*A. oregana* Nutt.) Alaska to Calif., e. to Idaho. Cult. 1884. Zone IV.—Handsome tree with large lvs.

10. **A. hirsùta** Turcz. Tree to 20 m.; brts. villous at first, later glabrous; buds pubescent: lvs. broad-ovate to elliptic-ovate, 8–14 cm. long, acute, rounded at base, coarsely doubly serrate and shallowly lobed, dark green above, glaucous and rufous-pubescent beneath; petiole 2–4 cm. long: strobiles usually 3–4, ellipsoid to oblong-ovoid, 1.5–2 cm. long, short-stalked or sessile. S.I.2:t.3(c). G.F.10:473. S.L.94(h). (*A. tinctoria* Sarg., *A. incana* var. *h.* Spach.) N. E. Asia, N. Japan. Intr. about 1888. Zone IV.—Var. **sibírica** Schneid. Brts. glabrous or nearly so: lvs. hirsute only on the midrib and sparingly on the veins beneath. S.H.1:f.68h–h^2,72l;2:f.557i. (*A. incana* var.

s. Spach, *A. s.* Fisch.)—Handsome tree of broad-pyramidal habit and of vigorous growth while young.

A related species is **A. Matsúmurae** Callier. Lvs. smaller, broad-elliptic or obovate, emarginate at apex, scarcely lobulate and nearly glabrous beneath. S.H.2:f.557k. M.D.1918:t.15. (*A. incana* var. *emarginata* Matsum.) Japan. Intr. 1914. Zone V.

11. **A. incàna** Moench. Speckled A. Shrub or tree to 20 m.; brts. pubescent while young; bark smooth, light gray; stipules lanceolate: lvs. broad-elliptic to ovate, 4–10 cm. long, acute, usually rounded at base, doubly serrate and usually slightly lobulate, dull dark green above with impressed veins, glaucous or grayish green and pubescent or nearly glabrous beneath: strobiles 4–8, sessile or short-stalked, about 1.5 cm. long. H.W.2:16(h),t.13(c). Eu., Cauc., N. Am.—A very variable plant; the typical European form, distinguished as var. **vulgàris** Spach, is a shrub or tree to 20 m.: lvs. usually pubescent beneath, 4–8 cm. long; petiole more than ⅕ as long as blade. Eu., Cauc. Many forms of this var. are in cult.—Var. **aûrea** Schelle. Lvs. yellowish, pubescent beneath; brts. reddish yellow.—Var. **coccínea** Schelle. Lvs. yellowish, nearly glabrous beneath: brts. reddish yellow.—Var. **acuminàta** Reg. Lvs. lobed about halfway to the middle, with lanceolate serrulate lobes. S.H.1:f.72p. (Var. *pinnatifida* Dipp., var. *incisa* Bean, var. *laciniata* Hort.)—Var. **pinnatífida** Wahlenb. Lvs. small, deeply lobed, with broad serrate lobes. Mem. Soc. Nat. Mosc. 13:t.17,f.5,6. M.D.1918:t.21,f.13.—Var. **péndula** Callier. Brs. pendulous. Lustgard,4:143(h).—Var. **monstrôsa** Winkl. A form with fasciated brs.—Var. **americàna** Reg. Shrub, rarely small tree to 6 m.: lvs. usually glabrous and glaucous, 5–12 cm. long, sometimes pubescent beneath; petiole usually less than ⅕ of blade. Em.251,t. B.B.1:613. (Var. *glauca* Reg. in part, not Ait.) Nfd. to Sask., s. to Pa., Iowa and Neb.—Var. **tomophýlla** Fern. is a form with deeply and irregularly dissected lvs.; not yet intr.—Shrub or tree with dull dark green foliage of no particular ornamental merit.

A. i. × *rugosa* = *A. Aschersoniana;* see under No. 6.—*A. i.* × *glutinosa* = *A. hybrida;* see under No. 7.—*A. i.* × *subcordata* = *A. Koehnei;* see under No. 13.—*A. i.* × *japonica* = *A. spectabilis;* see under No. 14.

12. **A. cordàta** Desf. Tree to 15 m.; young brts. viscid, glabrous, finally reddish brown: lvs. suborbicular or broad-ovate, 5–10 cm. long, abruptly acuminate, cordate at base, serrulate, light green beneath, pubescent on the veins only when young and with axillary tufts of hairs; petiole 2–3 cm. long: strobiles 1–3, ovoid, 1.5–2.5 cm. long, stalked. B.M.8658(c). B.S.1:179. G.C.III.19:285. (*A. cordifolia* Ten, *A. tiliacea* and *pyrifolia* Hort.) Italy, Corsica. Intr. 1820. Zone V.—Round-headed tree with handsome glossy lvs. resembling those of a pear-tree.

A. c. × *glutinosa* = **A. elliptica** Requien. Lvs. obtuse or emarginate, rounded or subcordate at base; strobiles 2–5, smaller. M.D.1918:t.19,f.6,7. S.H.1:f.66q[1]. (*A. cordata* var. *nervosa* Hort.)

13. **A. subcordàta** C. A. Mey. Tree to 15 m.; brts. usually pubescent, reddish brown; buds puberulous: lvs. ovate to oblong-ovate, 5–16 cm. long, short-acuminate, rounded at base, serrate, usually pubescent on both sides while young, later glabrous above, light green and pubescent on the veins beneath: strobiles 1–4, oblong-ovoid, 1.5–2.5 cm. long, stalked. S.H.1:f.69a. (*A. cordifolia* var. *s.* Reg., *A. macrophylla* Hort.) Cauc., Persia. Cult. 1860. Zone VI.—Handsome tree with large broad lvs.

A. s. × *incana* = **A. Koèhnei** Callier. Brts. more densely pubescent: lvs. usually elliptic, acute; strobiles short-stalked or nearly sessile. S.H.1:f.69b-c. (*A. orientalis* var. *pubescens* Dipp.) Orig. unknown.—*A. s.* × *japonica* = **A.**

Spaèthii Callier. Lvs. ovate-lanceolate, sharply serrate, violet-purple when unfolding. S.H.2:f.555n-o. Orig. before 1908.

A related species is **A. orientàlis** Dcne. Tree to 15 m.; brts. glabrous: lvs. rounded or broad-cuneate at base, glabrous. S.H.1:f.66r-r¹. Syria. Probably not now in cult.

14. **A. japónica** Sieb. & Zucc. JAPANESE A. Tree to 25 m.; brts. glabrous or slightly pubescent while young: lvs. narrow-elliptic to oblong-lanceolate, rarely ovate-oblong, 6–12 cm. long, acuminate, cuneate, sharply and irregularly serrate or serrulate, glabrous or slightly pubescent when young, light green beneath; petiole 1.5–2.5 cm. long: strobiles 2–6, peduncled, about 1.5 cm. long. S.I.1:t.19(c). G.F.6:345. (*A. maritima* var. *j.* Reg.) Japan, N. E. Asia. Intr. 1886. Zone V.—Handsome pyramidal tree with dense dark green foliage.

A. j. × *incana* = **A. spectàbilis** Callier. Lvs. dull green above and sometimes slightly lobed. S.H.1:f.69h-h¹. Orig. before 1908.—*A. j.* × *subcordata* = *A. Spaethii;* see under No. 13.

15. **A. marítima** Nutt. SEA-SIDE A. Shrub or sometimes tree to 10 m.; brts. pubescent at first, finally dull orange or reddish brown; buds acute, scurfy-pubescent: lvs. oblong or obovate, acute or short-acuminate, rarely obtuse, cuneate at base, remotely serrulate, 6–10 cm. long, lustrous dark green above, light green and glabrous or nearly so beneath: strobiles 2–4, about 2 cm. long, short-stalked. Fl.IX. S.S.9:t.458. (*A. oblongata* Reg., not Ait. nor Willd.) Del., Md. and Okl. Intr. 1878.—Ornamental tall shrub very attractive in autumn with its dark green foliage and the yellow pendulous catkins.

A related species likewise flowering in autumn is **A. nítida** Endl. Tree to 30 m.: lvs. ovate to ovate-oblong, entire or remotely serrulate, 6–10 cm. long, glabrous; staminate catkins up to 15 cm. long: strobiles about 2.5 cm. long, stalked. B.M. 7654(c). Himal. Intr. 1882. Zone VI.

16. **A. cremastógyne** Burk. Tree to 40 m.; brts. pubescent while young, soon glabrous, finally reddish brown or dark purple: lvs. obovate to obovate-oblong or elliptic, abruptly acuminate, broad-cuneate at base, regularly and rather remotely serrate, 6–14 cm. long, dark green above, light green and usually floccose-pubescent beneath while young, soon glabrous, rarely pubescent on the veins: catkins of both sexes solitary in the axils of the young lvs.: strobiles 1.5–2 cm. long on slender stalks 2–6 cm. long, pendulous; nutlets with broad membranous wings. E.P.IV.61:128. C.C.75. Kew Bull. 1913: 164,t(h). W. China. Intr. 1908. Zone VII?

A closely related species is **A. lanàta** Duthie. Lvs. rufous-pubescent beneath: stalks of the strobiles not exceeding 4.5 cm. W. China. Intr. 1908. Zone VII?

3. **CARPÌNUS** L. HORNBEAM. Deciduous trees or sometimes shrubs; brts. slender; bark gray, smooth or scaly; buds acute with many imbricate scales: lvs. more or less 2-ranked, with 7–24 pairs of straight veins, serrate: staminate catkins pendulous, inclosed in the bud during winter; fls. without perianth, each bract with 3–13 stamens, 2-forked at apex; pistillate catkins terminal, slender; each bract with 2 fls. subtended each by 2 bractlets; perianth adnate to the ovary, with 6–10 teeth at apex; style short, with 2 linear stigmas; fr. a ribbed nutlet subtended by a large usually 3-lobed bract. Flowers in spring with the lvs.; fr. ripening in autumn. (The ancient name of the Hornbeam.)—About 20 species from Eu. to E. Asia, s. to the Himal., and in N. and C. Am.—Small or medium-sized trees with usually short trunk and deliquescent stem and with handsome foliage; the pendulous light green fruiting catkins are attractive in some species. The wood is very hard and tough.

A. Lvs. with 7–15 pairs of veins: bracts of staminate fls. broad-ovate, subsessile; bracts of fruiting catkins ovate to lanceolate, not imbricate, chartaceous: bark smooth. (Sect. EUCARPINUS Sarg.)
  B. Lvs. 4–12 cm. long, usually acuminate: fruiting bracts lobed at base.
    C. Brts. glabrous or only slightly pubescent when young: fruiting bracts with a lobe on each side.
      D. Lvs. acuminate or acute: fruiting bracts 2–5 cm. long.
        E. Buds small, about 3 mm. long, hairy at first; fruiting bracts 5–7-nerved at base. 1. *C. caroliniana*
        EE. Buds about 5 mm. long, glabrous; fruiting bracts 3–5-nerved....2. *C. Betulus*
      DD. Lvs. cuspidate: fruiting bracts about 1.5 cm. long.....3. *C. laxiflora*
    CC. Brts. densely pubescent: fruiting bracts lobed only on one side.....4. *C. Tschonoskii*
  BB. Lvs. 2.5–5, rarely 6 cm. long, usually acute: fruiting bracts without distinct lobes or with a very small lobe at base.
    C. Bracts serrate on both sides.....5. *C. orientalis*
    CC. Bracts not or slightly serrate on the inner side.....6. *C. Turczaninowii*
AA. Lvs. with 15–24 pairs of veins deeply impressed above: bracts of staminate fls. ovate-lanceolate, stipitate: fruiting bracts ovate, serrate, imbricate, membranous: bark scaly. (Sect. DISTEGOCARPUS Sarg.)
  B. Lvs. ovate-lanceolate, 2.5–3.5 cm. broad, with 20–24 pairs of veins, usually rounded at base.....7. *C. japonica*
  BB. Lvs. ovate, 4–7 cm. broad, with 15–20 pairs of veins, cordate at base...8. *C. cordata*

1. **C. caroliniàna** Walt. AMERICAN H. Small tree, rarely to 12 m.: lvs. ovate-oblong, acuminate, usually rounded at base, sharply and doubly serrate, 6–10 cm. long, glabrous except pilose on the nerves beneath and with axillary tufts of hairs: fruiting catkins slender-stalked, 5–10 cm. long; bracts ovate to ovate-lanceolate, 2–3 cm. long, with short and broad lateral lobes, usually serrate only on one margin. S.S.9:447. Em.t.199(c). Gn.24:418. (*C. americana* Michx., *C. virginiana* Michx. f.—Blue Beech.) Que. to Minn., s. to Fla. and Tex. Intr. 1812. Zone IV.—Handsome bushy tree with slender often slightly pendulous brs.; the lvs. turning scarlet and orange in autumn.

2. **C. bétulus** L. EUROPEAN H. Tree to 20 m.: lvs. similar to those of the preceding species, ovate to ovate-oblong, cordate or rounded at base, to 12 cm. long, of somewhat thicker texture, with the veins more impressed above: fruiting catkins 7–14 cm. long; bracts 3–5 cm. long with ovate-lanceolate middle lobe and ovate lateral lobes entire or remotely toothed on the margin. H.W.2:31,32(h),t.17(c). E.P.61:29. E.H.3:t.148–152(h). G.C.III. 53:397(h). Eu. to Persia. Long cult. Zone V.—Var. **purpúrea** K. Koch. Lvs. purple when young, becoming green.—Var. **incìsa** Ait. Lvs. rather narrow, deeply lobed, with often nearly entire lobes. S.H.1:f.76d–d^1. (Var. *asplenifolia* Hort., var. *heterophylla* Kirchn.)—Var. **quercifòlia** Desf. Lvs. smaller than of var. *incisa*, deeply lobed with broader serrate lobes. S.H.1: f.76e–e^1.—Var. **fastigiàta** Nichols. Of upright growth forming a narrow-pyramidal tree. (Var. *pyramidalis* Moehl.)—Var. **columnàris** Spaeth is similar, but slenderer.—Var. **péndula** Kirchn. With pendulous brs.—Var. **carpinízza** Neilr. is little different except in the usually entire fruiting bracts and the smaller lvs. often cordate at base and with only 7–9 pairs of veins.

3. **C. laxiflòra** Bl. Tree to 15 m.: lvs. ovate or elliptic, abruptly long-acuminate, obliquely rounded or subcordate at base, doubly serrate, 4–7 cm. long, glabrous beneath except in the axils of the veins: fruiting catkins loose, 5–7 cm. long; bracts slightly 3-lobed at base, with the middle lobe lanceolate, acute, serrate on one side; nutlets slightly resin-dotted. S.I.1:t.25(c). Japan. Intr. 1914. Zone V.—Var. **macrostáchya** Oliv. Lvs. ovate-oblong: fruiting catkins 6–9 cm. long; bracts obtusish, less distinctly lobed at base. H.I.20: 1989. (*C. Fargesii* Franch.) W. and C. China. Intr. 1900. Zone VI or VII?

4. **C. Tschonóskii** Maxim. Tree to 15 m.; young brts. and petioles soft-pubescent: lvs. elliptic-ovate to ovate-oblong, acuminate, rounded at base, irregularly or doubly, rather finely serrate, with mucronulate teeth, 4–9 cm.

long, pubescent on both sides when young, later only pilose on the nerves beneath, with 12–15 pairs of veins; fruiting catkins 5–7 cm. long, with pubescent stalk and rachis; bracts ovate to lanceolate, acute, serrate on one side, with a small lobe at base of the entire side; nutlet glabrous. S.I.2;t.11(c). N.K.2:t.9. (*C. yedoensis* Maxim., *C. Fauriei* Nakai.) Japan, N. E. Asia, N. China. Intr. 1894. Zone V.—Graceful shrubby tree.

Closely related species are: **C. Henryàna** Winkl. Lvs. ovate-lanceolate, simply and rather coarsely serrate, 4–7 cm. long: bracts ovate; nutlet puberulous. B.J.50 (Suppl.):507.f.7. (*C. Tschonoskii* var. *H.* Winkl.) C. and W. China. Intr. 1907. Zone VI?—**C. Fargesiàna** Winkl. Tree to 20 m.: lvs. ovate- to elliptic-oblong, short-acuminate, doubly serrate, 4–6.5 cm. long: bracts semi-ovate; nutlets pilose at apex and sparingly glandular, otherwise glabrous. E.P.IV.61:f.10G. B.J.50 (suppl.):506,f.6. (*C. yedoensis* Winkl., not Maxim.) China. Intr. 1920. Zone V. —**C. exímia** Nakai. Tree to 10 m.: lvs. ovate to ovate-oblong, doubly serrate, 8–10 cm. long, pubescent above and on the veins beneath, pairs of veins 14–16: bracts semi-ovate, about 2.5 cm. long; nutlet pilose at apex and sparingly glandular. N.K.2:t.8. Korea. Intr. 1921. Zone V?

5. **C. orientàlis** Mill. Shrub or small tree to 5 m.; young brts. and petioles silky-pubescent: lvs. ovate or elliptic-ovate, acute, usually rounded at base, sharply and doubly serrate, 2.5–5 cm. long, lustrous and dark green above, glabrous beneath except pilose on the midrib, with 11–15 pairs of veins: fruiting catkins 3–6 cm. long, with ovate bracts serrate on both sides, pilose below; nutlet pilose at apex. R.I.12:t.634(c). H.W.2:34. S.H.1:140. (*C. duinensis* Scop.) S. E. Eu., Asia Minor. Intr. 1739. Zone V.

6. **C. Turczaninìnôvii** Hance. Small shrubby tree to 5 m.; brts. and petioles tomentulose; stipules linear, persistent during the winter: lvs. ovate to broad-ovate, acute, usually rounded at base, doubly serrate, 3–5 cm. long, pilose on the nerves beneath and bearded in the axils, with 10–12 pairs of veins: fruiting catkins 3–4 cm. long, slender-stalked; bracts semi-ovate, acute, or obtuse, incisely serrate on one side, on the other with 1–3 small teeth at apex and with a very small lobe at base; nutlet resin-dotted. E.P. IV.61:34,f.10a–c,11. N.K.2:t.12. (*C. Paxii* Winkl., *C. stipulata* Winkl.) N. China, Korea. Intr. 1905. Zone V.—Var. **ovalifôlia** Winkl. Lvs. ovate or nearly ovate-oblong, scarcely doubly serrate, 3–6 cm. long: bracts not lobulate at base. E.H.3:t.201,f.5. (*C. Turczananowii* Franch., not Hance, *C. polyneura* Burk. in part, not Franch.) W. China. Intr. 1889. Zone V.—Graceful shrubby tree with small foliage.

7. **C. japónica** Bl. Tree to 15 m.; young brts. pubescent: lvs. oblong-ovate to oblong-lanceolate, acuminate, rounded or subcordate at base, irregularly and sharply serrate, 5–10 cm. long, glabrous or nearly so except brownish pubescent beneath on the nerves while young, with 20–24 pairs of veins: fruiting catkins slender-stalked, ovoid-oblong, 5–6 cm. long; bracts ovate, dentate, appressed and overlapping, about 2 cm. long; nutlet covered by a small bractlet opposite to the bract. S.I.1:t.24(c). G.F.6:365. R.H.1895:427. G.C.III.66:107. (*C. Carpinus* Sarg., *C. carpinoides* Mak., *Distegocarpus Carpinus* Sieb. & Zucc.) Japan. Intr. 1879, 1892. Zone IV.—Small tree with very handsome foliage.

8. **C. cordàta** Bl. Tree to 15 m.; young brts. and petioles slightly hairy at first, soon glabrous; terminal winter-bud about 2 cm. long: lvs. ovate to oblong-ovate, acuminate, cordate at base, irregularly and doubly serrate, 7–12 cm. long, slightly pubescent on the veins beneath or glabrous, with 15–20 pairs of veins: fruiting catkins slender-stalked, 6–8 cm. long; bracts appressed, overlapping, dentate, inflexed at the base and covering the nutlet. S.I.1:t.24(c). G.F.8:295. N.K.2:t.6. Japan, N. E. Asia, N. China. Intr.

1879. Zone V.—Var. **chinénsis** Franch. Brts. and petioles densely pubescent: lvs. smaller. S.H.2:f.558f. C. and W. China. Intr. 1901. Zone V.—A small tree with large very handsome foliage.

4. **ÓSTRYA** Scop. Hop-Hornbeam. Deciduous trees; bark scaly, rough; buds pointed, with many imbricate scales: lvs. doubly serrate, generally ovate to oblong-ovate: staminate catkins slender, pendulous, naked during the winter: fls. without perianth, each bract with 3–14 stamens, the filaments bifid at apex; pistillate catkins upright, slender, with 2 fls. in the axil of each deciduous bract; calyx adnate to the ovary which is enclosed in a tubular involucre formed by the union of a bract and 2 bractlets and open at the apex; stigmas 2, linear: fr. a ribbed nutlet, enclosed by the bladder-like involucre with rigid hairs at base, these imbricated into a short, slender-stalked pendulous strobile. Flowers appearing in spring with the lvs.; frs. ripening in autumn. (The ancient Greek name of a tree with hard wood.) Seven species in N. and C. Am., and in Eu. and in W. and E. Asia.—Ornamental small or medium sized round-headed trees with handsome foliage and attractive in autumn with their light green fruits.

A. Lvs. acuminate, 4–12 cm. long.
B. Lvs. slightly pubescent or nearly glabrous, with 11–15 pairs of veins.
C. Nutlet ovoid: petioles 5–10 mm. long, glandless; lvs. usually rounded at base. 1. *O. carpinifolia*
CC. Nutlets spindle-shaped: petioles 3–6 mm. long, like the brts. often with stalked glands: lvs. usually subcordate. 2. *O. virginiana*
BB. Lvs. soft-pubescent beneath, with 9–12 pairs of veins: nutlet narrow-ovoid. 3. *O. japonica*
AA. Lvs. acute or obtusish, 3–5 cm. long, with 5–8 pairs of veins. 4. *O. Knowltonii*

1. **O. carpinifòlia** Scop. European H. Tree to 20 m.; bark gray; young brts. pubescent: lvs. ovate to ovate-oblong, acuminate, usually rounded at base, sharply and doubly serrate, 4–10 cm. long, dark green and sparingly hairy above, sparingly hairy chiefly on the nerves beneath, with 12–15 pairs of veins: fruiting clusters 3.5–5 cm. long; nutlet ovoid, 4–5 mm. long, with a tuft of hairs at apex. H.W.2:35,t.18(c). R.H.1895:188(h),189. G.C.III. 8:274. E.H.3:t.153(h). (*O. italica* Winkl., *O. vulgaris* Willd., *O. Ostrya* Karst.) S. Eu., Asia Minor. Intr. 1724. Zone V.

2. **O. virginiàna** K. Koch. American H. Tree to 20 m., similar to the preceding species; bark brown: lvs. 6–12 cm. long, usually subcordate at base: nutlets spindle-shaped, 6–8 mm. long, glabrous at apex. S.S.9:t.545. Gn.24:230, 231. (*O. virginica* Willd., *O. italica* subsp. *v.* Winkl.—Ironwood.) Cape Breton, Ont. and Minn. to Fla. and Tex. Intr. 1692. Zone IV.—Var. **glandulòsa** Sarg. Young brts., petioles and peduncles with stalked glands. (*O. virginica* var. *g.* Spach.) The northern form.

3. **O. japónica** Sarg. Japanese H. Tree to 25 m.; similar to *O. carpinifolia*; brts. densely pubescent: lvs. irregularly, but scarcely doubly serrate, soft-pubescent on both sides: nutlet oblong-ovoid, 5–6.5 mm. long, glabrous at apex. S.I.1:t.25(c). G.F.6:384. (*O. virginica* var. *j.* Burk.) Japan, N. E. Asia, China. Intr. 1888. Zone V.

4. **O. Knowltònii** Cov. Tree to 10 m.; bark gray; lvs. ovate to elliptic, acute, sometimes obtusish, usually rounded at base, sharply serrate, 2.5–5 cm. long, soft-pubescent beneath, with 5–8 pairs of veins: fruiting catkins about 3 cm. long; nutlets oblong-ovoid, 6 mm. long, pilose at apex. S.S.9:t.446. G.F.7:115. N. Ariz. Intr. 1914. Zone V.

5. **OSTRYÓPSIS** Dcne. Deciduous shrubs; brts. pubescent; buds acute, with many imbricate scales: lvs. ovate, doubly serrate, plicate in bud: stami-

nate fls. in pendulous, oblong-cylindric catkins, naked during winter; each bract with 4–6 stamens; fls. without perianth; filaments bifid at apex; anthers pilose at apex; pistillate fls. in very short spikes, each bract with 2 fls., fl. enclosed in a 3-fid involucre; calyx adnate to the ovary; ovary with one ovule in each cell; style bifid: fr. a small nutlet enclosed in a tubular involucre 3-fid at the apex; cotyledones above ground, green. Fls. appearing with the lvs. (Ostrya and Greek *opsis*, appearance.) Two species in China.

O. Davidiàna Dcne. Shrub to 3 m., suckering from the base; young brts. pubescent: lvs. broad-ovate, acuminate, cordate at base, doubly serrate and usually lobulate, 3–7 cm. long, with scattered hairs above, pubescent and gland-dotted beneath; petioles about 5 mm. long; frs. 6–12 in a long-stalked dense cluster; involucre about 1.2–1.8 cm. long, finally splitting open on one side; nutlet ovoid, beaked, about 8 mm. long. L.I.t.3. E.P.IV.61:19. N. and W. China. Intr. about 1865. Zone V.—A small shrub without particular ornamental qualities, very similar to a small-leaved hazel, but may be distinguished by the presence of sessile red glands on the under side of the leaf.

A related species is **O. nòbilis** Balf. & W. W. Sm. which differs chiefly in its much larger, 4–12 cm. long, scarcely lobulate lvs. brownish tomentose beneath. S. W. China. Intr. ?

6. **CÓRYLUS** L. Hazel. Deciduous shrubs, rarely trees; buds obtuse, rarely acute, with many imbricate scales: lvs. generally ovate, usually doubly serrate and more or less pubescent, conduplicate in bud: staminate catkins cylindric, pendulous, naked during the winter; fls. without perianth, each bract with 4–8 stamens, filaments bifid, anthers pilose at apex; pistillate inflorescence head-like enclosed in a small scaly bud, with only the red styles protruding; ovaries with 1, rarely 2 ovules in each cell; style bifid to the base: fr. a subglobose or ovoid nut, with ligneous pericarp, included or surrounded by a large leafy variously toothed or dissected involucre, often tubular, in clusters at the end of the brts.; cotyledons thick, fleshy remaining inclosed in the nut. Fls. appearing before the lvs. in early spring; frs. ripening in autumn. (The ancient Latin name.) About 15 species in N. Am., Eu., and temp. Asia.—Large shrubs or trees partly cult. for their edible nuts and partly for ornament.

A. Involucre spiny: lvs. glabrous except pubescent on the veins beneath, teeth acuminate: winter-buds acute. (Sect. Acanthochlamys Spach.) ..... 1. *C. tibetica*
AA. Involucre not spiny: lvs. usually pubescent, teeth scarcely acuminate: winter-buds obtuse. (Sect. Avellana Spach.)
B. Involucre divided into linear recurved lobes; petiole about 2 cm. long.
C. Involucre campanulate, deeply divided, glandular ..... 2. *C. Colurna*
CC. Involucre tubular, contracted above the nut into a short tube with recurved lobes. 3. *C. chinensis*
BB. Involucre irregularly divided into lanceolate to ovate lobes: petiole usually about 1 cm. long.
C. Involucre consisting of 2 distinct or partly connate bracts.
D. Lobes of involucre dentate-serrate.
E. Involucre not or only slightly longer than nut ..... 4. *C. Avellana*
EE. Involucre about twice as long as nut, usually tightly inclosing it. 5. *C. americana*
DD. Lobes of involucre triangular-ovate, entire or sparingly dentate. 6. *C. heterophylla*
CC. Involucre tubular.
D. Involucre pubescent, slightly contracted into a wide tube ..... 7. *C. maxima*
DD. Involucre setose, abruptly contracted above the nut.
E. Petiole 1.5–2.5 cm. long: anthers reddish ..... 8. *C. Sieboldiana*
EE. Petiole 6–12 mm. long: anthers yellow ..... 9. *C. cornuta*

1. **C. tibética** Batal. Tibetan H. Shrubby tree to 8 m.; brts. glabrous, brown, with conspicuous lenticels: lvs. broad-ovate to obovate, subcordate or rounded at base, long-acuminate, unequally and sharply serrate, 5–12 cm.

long, with silky hairs on the veins beneath; petioles 1.5–2.5 cm. long: bracts of staminate fls. acuminate, glabrous at apex: nuts 3–6 with spiny and glabrous involucres forming a bur about 4–5 cm. across; nut subglobose, compressed, 1–1.5 cm. long. V.F.206(h). R.H.1910:203,t(c). M.O.432. (*C. ferox* var. *t.* Franch.) C. and W. China. Intr. 1897. Zone VI.—A very distinct species remarkable for its fruit-clusters which resemble the burs of the chestnut.

The closely related **C. férox** Wall. with narrower more oblong lvs. and pubescent spiny involucre from the Himal. is probably tenderer. E.P.IV.61:45. Intr. 1924.

2. **C. colúrna** L. TURKISH H. Tree to 25 m.; bark light yellowish gray; brts. glandular-pubescent, older brs. furrowed, corky: lvs. broadly ovate to obovate, acuminate, cordate at base, doubly serrate or crenate-serrate and sometimes lobulate, 8–12 cm. long, nearly glabrous above, pubescent on the nerves beneath; petioles 1.5–2.5 cm. long, glandular-pubescent at first: staminate catkins 5–7 cm. long: frs. clustered; involucre deeply divided into linear recurved glandular lobes; nut 1.5–2 cm. across. H.W.2:29. G.C.III.40:257(h). Gn.31:260, 261. E.H.3:t.147(h). Gt.54:532;62:355(h). S. E. Eu., W. Asia. Intr. 1582. Zone V.—Var. **glandulífera** DC. Petioles, peduncles and involucre glandular-setose. R.I.12:t.638,f.1303(c).—Handsome tree of regular pyramidal habit.

C. c. × *avellana* = **C. colurnoïdes** Schneid. Shrubby tree with short-acuminate, more sharply serrate lvs.; involucre glandular-setose, divided to about the middle into narrow dentate lobes sometimes partly connate. Goeschke, Haseln. t.76. S.H.1:f.83r. (*C. intermedia* Lodd., not Fingerh.) Orig. before 1835.

A closely related species is **C. Jacquemóntii** Dcne. Lvs. distinctly obovate and sharply serrate; involucre not glandular-bristly. Kew Bull. 1913,t. (*C. colurna* var. *lacera* Winkl.) Himal. Cult. 1898.

3. **C. chinénsis** Franch. CHINESE H. Tree to 40 m.; bark furrowed, light colored; brts. brown, pilose and glandular: lvs. ovate to ovate-oblong, acuminate, very oblique and cordate at base, doubly serrate, not lobulate, 10–18 cm. long, glabrous above, pubescent on the nerves beneath; petiole 1–2.5 cm. long, sometimes longer, pubescent and glandular: frs. 4–6, clustered; involucre striate, finely pubescent, much contracted above the nut into a short tube divided into linear lobes usually forked at apex; nut subglobose, about 1.5 cm. across. C.C.73. E.P.IV.61:f.14h,15. S.H.2:f.560c, 561d. M.O.t.40.—C. and W. China. Intr. 1895. Zone V.—Handsome tree with large lvs. and spreading brs. forming a broad-oval head.

A related species is **C. Fargèsii** Schneid. Lvs. obovate to oblong: involucre with broader serrate lobes. E.P.IV.61:f.14f. (*C. rostrata* var. *F.* Franch.) Not yet intr.

4. **C. Avellàna** L. EUROPEAN H. Shrub to 5 m.; brts. glandular-pubescent: lvs. suborbicular to broad-obovate, abruptly acuminate, cordate at base, doubly serrate and often slightly lobulate, 5–10 cm. long, slightly pubescent or nearly glabrous above, pubescent beneath, particularly on the nerves; petioles 8–15 mm. long; staminate catkins 3–6 cm. long: frs. 1–4; involucre shorter or rarely slightly longer than the nut, deeply and irregularly divided into narrow, often toothed lobes; nut globose to ovoid, 1.5–2 cm. long. H.W. 2:28,t.16(c). R.I.12,t.636(c). Eu. Long cult. Zone III?—Var. **aùrea** Kirchn. Lvs. yellow; brts. yellowish. Goeschke, Haseln.,t.8.—Var. **fusco-rúbra** Dipp. Lvs. dull purple or brownish red. Goeschke, Haseln.,t.4. (F. *atropurpurea* Winkl., var. *purpurea* Bean.)—Var. **heterophýlla** Loud. Lvs. pinnately lobed with acute serrate lobes. Goeschke, Haseln.,t.5. S.H.1:146,f.83d. (Var. *laciniata* Kirchn., var. *pinnatifida* Hort.)—Var. **péndula** Dipp. With pendu-

lous brs. Goeschke, Haseln.,t.7. G.W.2:13;19:94(h).—Var. **contórta** Bean. With twisted and curled brs. G.C.III.16:380. Intr. before 1863.—Var. **grándis** Lam. Cobnut. Nut large, usually subglobose. R.I.12:t.638,f.1302(c). —Var. **póntica** Winkl. Lvs. suborbicular, pubescent beneath; petioles short; involucre longer than the nut, with much divided spreading lobes; nut large, broad-ovoid. F.S.21,t.2223–4(c). Goeschke, Haseln.,t.13,14,29. Jour. N. Y. Bot. Gard. 14:13,t.3(h). (*C. p.* K. Koch.) Cauc.—The larger fruited forms of this species are much cult. in Europe for the edible nuts.

C. a. × *maxima;* see under No. 7.

5. **C. americàna** Marsh. American H. Shrub to 3 m.; young brts. and petioles glandular-pubescent: lvs. broad-ovate or oval, short-acuminate, rounded or subcordate at base, irregularly and doubly serrate, 6–12 cm. long, sparingly pubescent above, soft-pubescent beneath; petioles 8–15 mm. long: staminate catkins 3.5–7 cm. long: frs. 2–6, rarely solitary; involucre about twice as long as nut, usually tightly enclosing it, deeply and irregularly lobed, downy and often glandular-bristly; nut subglobose, about 1.5 cm. across. B.B.1:607. Goeschke, Haseln.,t.71,72. (*C. calyculata* Dipp.) N. E. to Sask. and s. to Fla. Intr. 1798. Zone IV.

6. **C. heterophýlla** Fisch. Shrub or small tree to 7 m.; brts. and petioles glandular-hairy: lvs. orbicular-ovate to obovate, abruptly acuminate from a usually nearly truncate apex, cordate or rounded at base, irregularly serrate and usually lobulate, particularly near the apex, 5–10 cm. long, glabrous above, pubescent on the nerves beneath; petiole 1–2 cm. long: frs. usually 1–3; involucre campanulate, longer than the nut, striate, glandular-setose near the base, with 6–9 triangular, entire or sparingly dentate lobes; nut subglobose, about 1.5 cm. across. S.I.1:t.20(c). N.K.2:t.1. E.P.IV.61:49, f.14b. N. E. Asia, Japan. Intr. 1882 or earlier? Zone V.—Var. **sutchuenénsis** Franch. Lvs. less truncate at apex and usually glabrous or glabrescent beneath: lobes of the involucre often dentate and involucre sometimes shorter than nut. C. and W. China. Intr. 1909. Zone V.—Var. **yunnanénsis** Franch. Lvs. densely soft-pubescent beneath; petioles 5–10 mm. long, like the young brts. densely pubescent and stipitate-glandular. S. W. China. Intr. about 1910.—The typical species is easily recognized by the broad truncate and abruptly acuminate apex of its lvs., but this character is usually not so pronounced in the varieties.

7. **C. máxima** Mill. Filbert. Shrub or sometimes small tree to 10 m.; young brts. and petioles glandular-hairy: lvs. roundish-ovate to broad-obovate, abruptly acuminate, cordate at base, doubly serrate and usually lobulate, 7–14 cm. long; petioles 8–15 mm. long: staminate catkins 5–7 cm. long: frs. 1–3; involucre tubular, about twice as long as nut, downy and setose-glandular at base, at the apex irregularly lobed with serrate lobes; nut ovoid-oblong; kernel with thin red or white skin. H.W.2:30. E.P.IV.61:49,f.14a. R.I.12,t.637(c). (*C. tubulosa* Willd.) S. E. Eu., W. Asia. Long cult. Zone V.—Var. **purpúrea** Rehd. Lvs. dark purple. (Var. *atropurpurea* Bean, *C. avellana* var. *p.* Loud.) Goeschke, Haseln.t.57. F.E.21325(h).

Hybrids of this species and *C. avellana* are occasionally planted for their fruits. The involucre is more deeply divided and often little longer than the nut, sometimes split nearly to the base on one side. Goeschke, Haseln.t.65–70.

8. **C. Sieboldiàna** Bl. Japanese H. Shrub to 5 m.; brts. hairy; lvs. elliptic or obovate to oblong, acuminate, usually rounded at base, doubly serrate and slightly lobulate, 5–10 cm. long, nearly glabrous above, pilose on the veins beneath, often with a red blotch in the middle when young; petiole

1.5–2 cm. long: nuts 1–3; involucre tubular, 1.5–4 cm. long, much constricted above the nut, divided at the apex into short entire lobes, densely covered with loosely accumbent bristles; nut conical. S.I.1:t.20(c). N.K.2:t.4. E.P. IV.61:f.16b. (*C. rostrata* var. *S.* Maxim.) Japan. Cult. 1904. Zone V or VI.—Var. **mandshùrica** Schneid. MANCHURIAN H. Lvs. usually cordate at base, more distinctly lobulate, chiefly near apex, 7–12 cm. long, pubescent beneath chiefly on the veins; petiole to 2.5 cm. long: involucre slightly contracted above the nut, to 5 cm. long, with spreading bristles. B.M.8623(c). N.K.2:t.3. E.P.IV.61:f.14e. (*C. m.* Maxim., *C. rostrata* var. *m.* Reg.) N. E. Asia to N. China and N. Japan. Intr. 1882. Zone V or IV.—The var. is a vigorously growing shrub; its large bristly frs. conspicuous in autumn.

9. **C. cornùta** Marsh. BEAKED H. Shrub to 3 m.; young brts. slightly hairy: lvs. ovate to obovate, rarely ovate-oblong, acuminate, subcordate at base, densely serrate and sometimes lobulate, 4–10 cm. long, glabrescent above, downy beneath on the nerves; petioles 6–15 mm. long: frs. 1–2; involucre tubular, much constricted above the nut, 2.5–4 cm. long, densely bristly; nut ovoid, 1–1.5 cm. long, thin-shelled. B.B.1:607. G.F.8:345. S.H.1:f.83i-k,87a-c. (*C. rostrata* Ait.) Que. to Sask., s. to Mo. and Ga. Intr. 1745. Zone IV.

A closely related species is **C. califórnica** Rose. CALIFORNIAN H. Similar to the preceding species: leaves more downy beneath, cordate at base: fr. with a short beak about as long or little longer than the nut. E.P.IV.61:f.14d. A.I.1:510. (*C. rostrata* var. *c.* DC.) Wash. to Cal. Intr. 1910. Zone V.—Another related species is **C. cólchica** Alboff, with a tubular involucre little exceeding the nut, dissected at the apex and often leaving the nut partly exposed, downy, not bristly. E.P.IV.61:f.16a. Cauc. Not yet intr.

Fam. 14. FAGACEAE A. Br. BEECH FAMILY

Deciduous or evergreen trees, rarely shrubs; buds with imbricate scales: lvs. alternate, petioled, penninerved, entire, dentate to pinnately lobed, stipulate with usually deciduous stipules: fls. monoecious, usually axillary on the young shoots; perianth 4–7-lobed; staminate spikes slender, each bract with 1 fl.; stamens as many or twice as many as perianth-lobes, rarely more; filaments usually slender; pistillate fls. solitary or in 3's forming spikes or short clusters, sometimes at base of the staminate spikes; ovary inferior, 3- or rarely 6-celled at base, with 3 styles; each cell with 2 ovules, all but one aborting: fr. a nut, solitary or 2–3 partly or wholly enclosed by an involucre or cupula; seed without albumen; cotyledons fleshy.—Six genera with about 600 species in the temp. and subtrop. regions of both hemispheres.

A. Staminate and pistillate fls. solitary or in stalked heads: involucre 2–4-lobed; nuts triangular: lvs. 2-ranked, entire or shallowly toothed: cotyledons above ground, green.
  B. Staminate and pistillate fls. solitary or 3: lvs. evergreen or deciduous, usually small: involucre with transverse entire or toothed scales ..... 1. *Nothofagus*
  BB. Staminate fls. in many-fld. heads; pistillate fls. 2: lvs. deciduous, rather large: involucre with prickly, subulate or bract-like appendages, with 2 nuts ..... 2. *Fagus*
AA. Staminate fls. in slender spikes; pistillate fls. solitary or in spikes; involucre not or irregularly splitting: cotyledons remaining in the seed.
  B. Staminate fls. in upright spikes.
    C. Lvs. deciduous, dentate, 2-ranked: ovary 6-celled; 1–3 frs. in one involucre: terminal bud wanting ..... 3. *Castanea*
    CC. Lvs. evergreen, entire or dentate: ovary 3-celled: terminal bud present.
      D. Involucre usually spiny, usually wholly enclosing the 1–3 nuts: lvs. usually 2-ranked ..... 4. *Castanopsis*
      DD. Involucre of fr. not spiny, usually cup-shaped; nut always solitary; styles cylindric with the stigma at apex: lvs. not 2-ranked ..... 5. *Lithocarpus*
  BB. Staminate fls. in pendulous catkins; styles flattened, with the stigma on the upper surface: lvs. entire to lobed, deciduous or evergreen ..... 6. *Quercus*

1. **NOTHOFÀGUS** Bl. Deciduous or evergreen trees or shrubs: lvs. usually small, 1–5 cm. long, rarely larger, short-petioled, usually plicate in bud, entire or serrate: staminate fls. short-stalked, solitary or in 3-fld. cymes; stamens 8–40; calyx campanulate, 4–6-lobed: pistillate fls. 1–3, in a sessile or short-stalked involucre: nuts 3-angled, usually 3 in a 2–4-lobed involucre bearing outside transverse, entire, toothed or lobed lamellae, with or without gland-tipped appendages. (Greek *nothos*, hybrid, and *fagus;* meaning not a true beech.) About 17 species in antarctic S. America, Australia and N. Zeal.—Little known in cult. and probably hardy only near the southern limit of our area.

A. Lvs. evergreen, 1.5–3.5 cm. long.....1. *N. fusca*
AA. Lvs. deciduous.
B. Lvs. 1–3 cm. long.....2. *N. antarctica*
BB. Lvs. 3.5–7 cm. long.....3. *N. obliqua*

1. **N. fúsca** Oerst. Tree to 35 m.; brts. zigzag, puberulous: lvs. broad-ovate to suborbicular, acute or rounded at apex, cuneate to truncate at base, coarsely dentate, 1.5–3.5 cm. long, glabrous except ciliate on the margin, with usually 3–4 pairs of veins; petioles pubescent, 2–4 mm. long: involucre sessile, scarcely 1 cm. long, 4-lobed, with large toothed lamellae, with 3 nuts. Kirk, For. Fl. N. Zeal.t.90. Gn.88:845. (*Fagus f.* Hook. f.) N. Zeal. Intr. about 1880. Zone VIII?

Other evergreen species are: **N. betuloìdes** Bl. Tree with viscid young shoots and ovate, serrulate, very close-set lvs. 1–2.5 cm. long. G.C.III.33:11. Chile. Intr. 1830.—**N. cliffortioides** Oerst. Tree with entire lvs. 6–15 mm. long. Cheeseman, Ill. N. Zeal. Fl. 2:t.183. N. Zeal. Intr. about 1880? Zone VIII?—**N. Dombeỳi** Bl. Tree: lvs. ovate to ovate-lanceolate, 2–3.5 cm. long, finely toothed, lustrous above, black-dotted on both sides. Chile. Intr. 1916.

2. **N. antárctica** Oerst. Tree to 35 m.; brts. tomentulose: lvs. broad-ovate to oblong, obtuse, truncate or cordate at base, irregularly crenulate or serrulate and sometimes lobulate, 1.5–3 cm. long, glabrous except puberulous on the midrib beneath, with 3–4 pairs of veins; petioles puberulous, 2–5 mm. long: involucre 4-lobed, with entire lamellae; nuts 3. B.M.8314(c). B.S.2:98. (*Fagus a.* Forst.) Chile. Intr. 1830. Zone VIII?

3. **N. oblìqua** Bl. Tree to 35 m.; brts. glabrous; lvs. ovate to oblong-ovate, obtuse or acutish, rounded or broad-cuneate at base, serrate, lobulate below the middle, 3–7 cm. long, glabrous, with 8–11 pairs of veins; petioles about 6 mm. long; staminate fls. solitary, with 30–40 stamens: involucre 4-lobed, with 2 triangular and one flattened nut. J.L.37:53,f.25. Gn.83:511; 88:831. (*Fagus o.* Mirbel.) Chile. Intr. 1849. Zone VIII?

A related species is **N. procèra** Oerst. Tree: lvs. oblong, rounded at both ends, doubly and finely serrate, 3–10 cm. long, with 14–18 pairs of veins, pubescent beneath. Chile. Intr. 1913. Zone VIII?

2. **FÀGUS** L. Beech. Deciduous trees; bark smooth; buds elongated, acute: lvs. 2-ranked, dentate or nearly entire, plicate in bud: staminate fls. many, in slender-peduncled heads; perianth 4–7-lobed, stamens 8–16; pistillate fls. usually 2, surrounded by numerous bracts united below into a 4-parted peduncled involucre; styles 3, slender, recurved: nuts ovoid, triangular, 1 or 2 in a woody 4-valved involucre covered outside with prickly or bract-like, rarely short and deltoid appendages. Fls. appear with the lvs.; frs. ripen in autumn. (The ancient Latin name of the beech.) Nine species in the temp. regions of the n. hemisphere.—Ornamental trees with handsome foliage; the nuts are edible and contain oil. Particularly in Eu. the Beech is an important timber tree.

A. Stalk of involucre stout, 5–25 mm. long, pubescent: lvs. green beneath.
B. Appendages of involucre all subulate.
C. Lvs. with 9–14 pairs of veins, serrate ..... 1. *F. grandifolia*
CC. Lvs. with 5–9 pairs of veins, denticulate ..... 2. *F. sylvatica*
BB. Appendages at base of involucre bract-like, linear to spatulate.
C. Lvs. broadest below the middle, usually crenate: peduncle 0.5–1.5 cm. long. 3. *F. Sieboldii*
CC. Lvs. broadest above the middle, nearly entire; peduncle 2–2.5 cm. long. 4. *F. orientalis*
AA. Stalk of involucre slender, 2.5–7 cm. long, glabrous or nearly so: lvs. glaucescent beneath.
B. Involucre about as long as nut.
C. Lvs. pubescent beneath; petioles 1–2 cm. long: appendages of involucre all subulate. 5. *F. longepetiolata*
CC. Lvs. glabrous beneath; petioles 5–10 mm. long: appendages at base of involucre. 6. *F. Engleriana*
BB. Involucre about half as long as nut, covered with short deltoid processes: lvs. glabrous beneath ..... 7. *F. japonica*

1. **F. grandifòlia** Ehrh. AMERICAN B. Tree to 30, rarely to 40 m.; bark light gray: lvs. ovate-oblong, acuminate, usually broad-cuneate at base, coarsely serrate, 6–12 cm. long, dark bluish green above and light green and usually glabrous below at maturity, silky when unfolding; petiole 3–8 mm. long: involucre with slender straight or recurved prickles, about 2 cm. long; stalk 5–10 mm. long. S.S.9:t.444. Em.182,t(c). G.F.8:125(h). A.G.12: 711(h). (*F. ferruginea* Ait., *F. americana* Sweet, *F. atropunicea* Sudw.) N. B. to Ont., s. to Fla. and Tex. Intr. about 1800. Zone IV.—Var. **pubéscens** Fern. & Rehd. Lvs. more or less soft-pubescent beneath.—Var. **caroliniàna** Fern. & Rehd. Lvs. darker green and of firmer texture, ovate to obovate, less coarsely toothed; involucre rufous-tomentose, prickles shorter and fewer. (*F. ferruginea* var. *c.* Loud.) N. J. and s. Ill. to Fla. and Tex. Cult. 1836. Zone V.

2. **F. sylvática** L. EUROPEAN B. Tree to 30 m.; bark gray: lvs. ovate or elliptic, acute, broad-cuneate or rounded at base, remotely denticulate, 5–10 cm. long, lustrous dark green above, light green beneath and usually glabrous at maturity, silky and ciliate while young; petiole 5–10 mm. long: involucre about 2.5 cm. long, with usually upright prickles; stalk 1–15 mm. long. H.W. 2:42,t.20(c). F.E.33:615(h). M.G.17:579–582(h). E.H.1:t.1–12(h). Centr. and S. Eu., e. to Crimea. Long cult. Zone V. Numerous forms differing in shape and color of the lvs. and in habit are in cult., of which the following are those best known: Var. **atropunícea** West. PURPLE B. With purple lvs. A.G.18:837(h). F.E.13:472(h);14:874(h). S.L.t.5(hc). (Var. *purpurea* Ait.; here also belong var. *cuprea* Loud., var. *atropurpurea* Reg., var. *Riversii* Rehd., var. *nigra* Hort., var. *sanguinea* Kuntze, var. *purpurea macrophylla* and var. *p. major* Hort., differing in the deeper or lighter color of the lvs. and in other slight characters. Known since 1680. Var. **trícolor** K. Koch. Lvs. nearly white, spotted green, and with pink margin. Var. **roseo-marginàta** Henry. Lvs. purple, with an irregular light pink border. Ill. Monatsh. Gartenb.7:t.10(c). R.B.12:145,t(c). (Var. *atropurpurea tricolor* André.)—Var. **zlàtia** Spaeth. Lvs. yellow when young, finally nearly green.—Var. **luteo-variegàta** West. Lvs. variegated with yellow. (F. *aureo-variegata* Schneid.) Intr. before 1770.—Var. **albo-variegàta** West. Lvs. variegated with white. (Var. *argenteo-variegata* Henry.) Intr. before 1770.—Var. **laciniàta** Vignet. Lvs. narrowly elliptic to lanceolate, incisely serrate to deeply lobed, sometimes linear and nearly entire. L.A.3:f.1875. S.H.1:155, f.91l. F.E.18:314(h). B.S.1:552,t(h). (Var. *incisa* Hort., var. *heterophylla* Loud.)—Var. **asplenifòlia** Sweet. Similar to the preceding, but lvs. very narrow, often linear. S.H.1:f.91m. (Var. *comptoniaefolia* Kirchn., var. *salicifolia* Hort.)—Var. **Rohànii** Koerber. With purple lvs. similar in shape

to var. *laciniata*. M.G.23:499. Intr. about 1894.—Var. **quercifòlia** Schelle. Lvs. ovate-oblong, with short and broad obtusish lobes often undulate and sometimes slightly toothed. (Var. *quercoides* Booth Cat., not Persoon; the latter is a form with oak-like bark; M.G.24:509.)—Var. **cristàta** Loud. Slow-growing form with small, clustered lvs. deeply toothed and curled. L.A.3: f.1877.—Var. **rotundifòlia** Gard. Chron. With very small close-set lvs. suborbicular and often subcordate at base, only 1.5–3 cm. long. Intr. 1872.—Var. **latifolia** Kirchn. Lvs. very large and broad, nearly entire, up to 15 cm. long and to 10 cm. broad. (Var. *macrophylla* Dipp., not DC.)—Var. **fastigiàta** K. Koch. Tree of fastigiate habit with glabrous glossy lvs. Hesse, Cat. 1913–14,t(h). (Var. *Dawyckii* Hesse, var. *pyramidalis* Hort., not Kirchn.)—Var. **péndula** Loud. With pendulous brs., the larger limbs usually horizontally spreading. Gg.6:258(h). G.F.1:32(h). G.C.III.51:114(h). B.S.1:552, t(h).—Var. **purpúreo-péndula** Rehd. A pendulous form with purple lvs. (Var. *purpurea pendula* Jaeg.)—Var. **tortuòsa** Pépin. Dwarf spreading form with twisted and contorted brs. pendulous at the tips. R.H.1864:130(h). M.D. 1911:269(h);1912:111–3(h);1913:308–9(h). G.W.14:511(h). (Var. *remillyensis* Simon-Louis, var. *suentelensis* Hort.) Similar forms partly intermediate between this and *pendula* are: var. *pagnyensis* Simon-Louis, var. *borneyensis* Henry, var. *miltonensis* Henry, var. *retroflexa* Dipp.

3. **F. Sieböldii** Endl. Siebold's B. Tree to 30 m.; young brts. nearly glabrous: lvs. ovate to rhombic-ovate, short-acuminate, broad-cuneate or rounded and sometimes subcordate at base, shallowly crenate, 5–10 cm. long, with 7–10 pairs of veins, at maturity glabrous except slightly pubescent on the nerves beneath; petioles 3–10 mm. long, nearly glabrous, slender: involucre 1.5–2 cm. long, with long bristles, the lower ones changed into linear or spatulate bracts; stalk 5–15 mm. long, pubescent. S.I.1:t.35(c). (*F. sylvatica* var. *S.* Maxim., *F. sylvatica* var. *asiatica* DC.) Japan. Intr. 1892. Zone V.

4. **F. orientàlis** Lipsky. Oriental B. Tree to 40 m.; brts. pubescent: lvs. elliptic to obovate or obovate-oblong, acute or short-acuminate, broad-cuneate or rounded at base, with entire or slightly undulate margin, 6–12 cm. long, glabrous except silky pubescent on the nerves beneath, with 7–10 pairs of veins curving before reaching the margin; petioles pubescent, 5–15 mm. long: involucre about 2 cm. long, the lower prickles changed into spatulate bracts; stalk pubescent, 2–2.5 cm. long. S.H.1:f.88. (*F. sylvatica* var. *macrophylla* DC., *F. macrophylla* Koidz., *F. Winkleriana* Koidz.) Asia Minor, Cauc., N. Persia. Intr. 1904. Zone V.

5. **F. longipetiolàta** Seemen. Tree to 25 m.; bark pale gray; brts. glabrous: lvs. ovate to ovate-oblong, acuminate, broad-cuneate at base, remotely serrate, 7–12 cm. long, finely and densely pubescent beneath and glaucescent, with 9–12 pairs of veins ending in the teeth; petioles slender, 1–2 cm. long, glabrous: involucre 2–2.5 cm. long, with slender, mostly recurved bristles; stalk 3–6 cm. long, glabrous except near the apex. H.I.20:1936. C.C.81. (*F. sylvatica* var. *longipes* Oliv., *F. sinensis* Oliv.) C. and W. China. Intr. 1911. Zone V.

6. **F. Engleriàna** Seemen. Tree to 23 m., usually smaller, dividing at base into many stems; brts. glabrous: lvs. ovate to elliptic-ovate, rarely oblong-ovate, short-acuminate, broad-cuneate or sometimes rounded and subcordate at base, with sinuate margin, 4–8, rarely to 11 cm. long, glaucescent and glabrous beneath except long silky hairs along the nerves, with 10–14 pairs of veins curving before the margin; petioles slender, 5–10 mm.

long, glabrous: involucre about 1.5 cm. long, covered with linear foliaceous bracts; stalk slender, 4–7 cm. long, glabrous. C.C.83. (*F. sylvatica* var. *chinensis* Franch.) C. China. Intr. 1911. Zone V.

An incompletely known Chinese species is **F. lùcida** Rehd. & Wils. which differs chiefly in the lustrous bright green under side of its lvs. and their peculiar dentation, the margin being sinuate with the veins projected from the base of the sinuses and forming small triangular teeth: fls. and frs. unknown. Intr. 1911. Zone V.

7. **F. japónica** Maxim. JAPANESE B. Tree to 25 m., dividing at base into several stems; brts. glabrous: lvs. ovate or elliptic-ovate, short-acuminate, rounded or subcordate, rarely broad-cuneate at base, slightly sinuate-crenate or nearly entire, 5–8 cm. long, glaucescent and glabrous beneath except silky hairs along the midrib, with 9–14 pairs of veins bending before the margin; petioles about 1 cm. long, glabrous: involucre 6–8 mm. long, with short deltoid processes outside; nut exserted; stalk slender, glabrous, about 3 cm. long. S.I.1:t.35(c). N.K.3:t.1. Japan. Intr. 1905. Zone V.

3. **CASTÁNEA** Mill. CHESTNUT. Deciduous trees, rarely shrubs; bark furrowed; buds with 3–4 scales; brts. without terminal bud: lvs. 2-ranked, serrate, with numerous parallel veins: staminate fls. in erect cylindrical catkins; calyx 6-parted; stamens 10–20; pistillate fls. on the lower part of the upper staminate catkins, rarely on separate catkins, usually 3 together in a prickly involucre; ovary 6-celled; nuts large, brown, 1–3, rarely 5 or 7 in a prickly involucre, splitting at maturity into 2–4 valves. (The ancient Latin name of the chestnut.) Eight species in the temperate regions of the n. hemisphere.—Planted as fruit trees for their large edible nuts which are an important article of food in some countries; also as ornamental trees for their large handsome foliage and for the attractive staminate flowers. The coarse-grained wood is very durable in the soil. The Chestnut trees like warm situations, well-drained soil and stand drought better than most trees.

A. Nuts usually 2 or 3 in one involucre, usually broader than high.
  B. Lvs. glabrous, cuneate at base, 12–24 cm. long: winter-buds glabrous or nearly so. ..... 1. *C. dentata*
  BB. Lvs. pubescent beneath, at least while young: often rounded at base: winter-buds pubescent.
    C. Lvs. without lepidote glands beneath: brts. short-pubescent and with long spreading hairs at least on vigorous shoots ..... 2. *C. mollissima*
    CC. Lvs. more or less lepidote-glandular beneath, at least near the nerves: brts. tomentose or puberulous while young.
      D. Lvs. tomentose beneath, at least while young.
        E. Lvs. coarsely serrate, 12–22 cm. long: tree ..... 3. *C. sativa*
        EE. Lvs. crenate-serrate, 8–16 cm. long: usually shrubby ..... 4. *C. crenata*
      DD. Lvs. pubescent beneath only on the veins, densely lepidote-glandular: usually shrubby ..... 5. *C. Seguinii*
AA. Nuts solitary, terete and usually higher than broad, only exceptionally 2.
  B. Lvs. tomentose beneath, usually elliptic-oblong ..... 6. *C. pumila*
  BB. Lvs. glabrous, usually oblong-lanceolate, long-acuminate, slender-petioled. . 7. *C. Henryi*

1. **C. dentàta** Borkh. AMERICAN C. Tree to 30 m.; brts. glabrous or nearly so: lvs. oblong-lanceolate, acuminate, cuneate at base, coarsely serrate, 12–24 cm. long, glabrous except minute glands beneath when young: nut 1.5–2.5 cm. across, usually 2 or 3, rarely 5; involucre 5–6 cm. across. S.S.9:t.440–1. Em.187,t(c). G.F.10:373(h). Am. For. 21:957;26:619;27:43(h) (*C. americana* Raf.) S. Me. to Mich., s. to Ala. and Miss. Cult. 1800. Zone IV.

C. d. × *pumila* = *C. neglecta;* see under No. 6.—*C. d.* × *crenata;* see under No. 4.—*C. d.* × *sativa;* see under No. 3.

2. **C. mollíssima** Bl. CHINESE C. Tree to 20 m.; sometimes shrubby; brts. short-pubescent and, at least on vigorous shoots, with long spreading hairs: lvs. elliptic-oblong to oblong-lanceolate, 8–15 cm. long, acuminate,

rounded or truncate at base, coarsely serrate, whitish tomentose or green and soft-pubescent beneath, at least on the veins, without lepidote glands; petiole short-pubescent and pilose: nuts 2–3 cm. across, usually 2–3, the hilum smaller than the base; spines of involucre pubescent. C.C.85. N.K. 3:t.2–6. S.H.2:f.563c-d. U.S.Im.79:t. (*C. Bungeana* Bl., *C. Duclouxii* Dode, *C. hupehensis* Dode, *C. sativa* var. *m.* Pampan.) China, Korea. Intr. 1853 and 1903. Zone V.

3. **C. sativa** Mill. Spanish C. Tree to 30 m.; trunk sometimes with a girth of 10 m.: brts. soon glabrous: lvs. oblong-lanceolate, 12–22 cm. long, acute or short-acuminate, broad-cuneate or rounded or sometimes subcordate at base, coarsely serrate, pubescent or tomentose beneath while young and with lepidote glands at least near the veins, glabrous or nearly so at maturity, upright: nuts 2–3 cm. across, 1–3. H.W.2:37(h),t.19(c). E.H.4:t.232–6(h). Gg.3:209(h). S.H.1:158(h). (*C. vesca* Gaertn., *C. vulgaris* Lam., *C. Castanea* Karst.) S. Eu., W. Asia, N. Afr. Long cult. Zone V.—Var. **aspleniifòlia** Loud. Part of the lvs. linear with irregularly lobed or crenate margin, others nearly normal but narrower and more deeply serrate. S.H.1:f.91r. G.C.III. 74:309. (Var. *heterophylla* Bean.)—Var. **prolífera** K. Koch. Lvs., at least the upper ones, with persistent tomentum beneath.—There are also variegated forms.

C. s. × *dentata;* here belongs probably "Paragon."—*C. s.* × *pumila;* see under No. 6.

4. **C. crenàta** Sieb. & Zucc. Japanese C. Shrub or small tree to 10 m., occasionally taller; brts. tomentose: lvs. elliptic to oblong-lanceolate, acuminate, rounded or subcordate at base, crenate-serrate, the teeth sometimes reduced to bristles, 8–16 cm. long, usually tomentose and glandular-lepidote beneath, sometimes nearly glabrous, or pubescent only on the nerves: spines of involucre nearly glabrous; nuts 2–3, rarely 5, 2–3 cm. across, the hilum covering the whole base. S.I.1:34(c). E.H.4:t.237. (*C. japonica* Bl., *C. sativa* var. *pubinervis* Mak.) Japan. Intr. 1876. Zone V.

C. c. × *dentata.* Orig. 1908; Jour. Hered. 13:305–13(h,fr).—*C. c.* × *pumila.* Orig. before 1911 (see U. S. Inv.21:28).

5. **C. Seguìnii** Dode. Shrub or small tree to 10 m.; young brts. short-pubescent: lvs. elliptic-oblong or oblong-obovate to lanceolate-oblong, acuminate, rounded or sometimes subcordate or broad-cuneate at base, coarsely serrate, 6–14, rarely to 16 cm. long, green beneath and lepidote-glandular, pilose only on the nerves or sometimes nearly glabrous, with 12–16 pairs of veins; involucre 3–4 cm. across, with sparsely pilose spines; nuts usually 3, rarely 5 or 7, 1–1.5 cm. across. U.S.Inv.54:t.3(fr). B.D.1908:151, 154(fr). S.H.2:f.563e-f(fr). (*C. Davidii* Dode.) E. and C. China. Intr. 1853 and 1907. Zone VI or VII?

6. **C. pùmila** Mill. Chinquapin. Shrub or small tree; brts. tomentose: lvs. elliptic-oblong or oblong-obovate, acute, rounded or broadly cuneate at base, coarsely serrate or the teeth reduced to bristles, 7–12 cm. long, white-tomentose beneath; involucre 2.5–3.5 cm. across; nut solitary, rarely 2, ovoid, pointed, 1.5–2 cm. long and about 1 cm. across. S.S.9:t.442–3. Gn. 88:821(h). M.O.t.39(h). Pa. to Fla. and Tex. Intr. 1699. Zone V.

C. p. × *dentata* = **C. neglécta** Dode. Lvs. less pubescent; fr. larger. B.D.1908: 143,f.9. N. C. Intr. ?—*C. p.* × *sativa;* orig. about 1903; Jour. Hered. 9:113–6(h,fr).

Closely related species are: **C. ozarkénsis** Ashe. Tree to 20 m.: lvs. 12–20 cm. long, coarsely toothed, white-tomentose, rarely glabrous beneath: fr. densely spiny, about 3 cm. across; nut 1.5–1.7 cm. high. (*C. arkansana* Ashe.) Ark. to s. w. Mo. Intr. 1891. Zone V.—**C. alnifòlia** Nutt. Low shrub to 0.5 m., with creeping root-stock: lvs. oblong or oblong-obovate, usually obtuse, 5–15 cm. long,

thinly tomentose or pubescent: involucre with fewer and shorter rigid spines. Bull. Torr. Bot. Club, 21,t.206. (*C. nana* Muhlb.) Ga. to Fla. and La. Cult. 1906. Zone VI.

7. **C. Hénryi** Rehd. & Wils. Tree to 25 or 30 m.; brts. glabrous: lvs. oblong-ovate to oblong-lanceolate or lanceolate, long-acuminate, truncate to cuneate at base, with bristle-like teeth, 8–16 cm. long, light green and glabrous and somewhat reticulate beneath, with 12–16 pairs of veins, chartaceous; petioles slender, 1–1.5 cm. long, glabrous: involucre about 2 cm. across with slightly pubescent spines; nut solitary, globose-ovoid, pointed, 1.5–2 cm. high. B.D.1908:156(fr). S.H.2:f.563h-k,564e. (*C. Vilmoriniana* Dode, *C. Fargesii* Dode, *Castanopsis Henryi* Skan.) C. and W. China. Intr. 1900. Zone V.

4. **CASTANÓPSIS** Spach. Evergreen trees, sometimes shrubby; buds with numerous scales: lvs. 2-ranked or 5-ranked, entire or dentate, coriaceous, convolute in bud: staminate fls. in upright simple or branched spikes; calyx 5–6-parted; stamens usually 10 or 12; pistillate fls. in separate usually short spikes, sometimes at the base of the staminate spikes, 1–3 in one involucre; ovary 3-celled; styles 3, terminating in minute stigmas: fr. a nut ripening the second year, 1–3 in an ovoid or subglobose involucre, dehiscent or indehiscent, covered outside with spines or tubercles or interrupted transverse ridges. (Greek *kastana*, chestnuts, and *opsis*, resemblance; alluding to its resemblance to the chestnut-tree.) About 30 species in s. and e. Asia, one in Calif.—Ornamental evergreen trees adapted for cult. only in warmer regions.

C. chrysophýlla DC. Tree to 35 m., sometimes shrubby; bark deeply ridged; brts. scurfy: lvs. ovate-oblong to oblong-lanceolate, narrowed at ends, entire, 5–14 cm. long, dark green and lustrous above, coated beneath with golden-yellow scales: husk subglobose, dehiscent, densely clothed with rigid spines; nut usually solitary, globose-ovoid, about 1 cm. high. S.S.9:t.439. B.M.4953(c). G.C.III.36:145. Jepson, Silv.Cal.t.74(h). (*Castanea c.* Hook.) Ore. to Calif. and Nev. Intr. 1845 and 1856. Zone VIII.—Var. **mínor** DC. A shrubby form with smaller 5–8 cm. long lvs., very golden yellow beneath, often slightly trough-shaped. Zone VII?—Var. **sempérvirens** Henry (*C. s.* Dudley), a shrubby form with oblong obtuse lvs. is probably not in cult.

The following Asiatic species have been intr. into cult., but are not, or little known in this country and probably not hardy north of Zone VIII.

A. Fr. spiny.

B. Brts. villous: lvs. fulvous-tomentose beneath.

1. **C. ceratacántha** Rehd. & Wils. Tree: lvs. oblong-lanceolate, obscurely toothed above the middle or entire, 10–15 cm. long: frs. fulvous, in stout spikes to 20 cm. long; nuts 2–3. W. China. Intr. 1908.

BB. Brts. glabrous: lvs. with a thin close tomentum beneath, midrib glabrous.

C. Lvs. usually entire: brts. stout.

2. **C. platyacántha** Rehd. & Wils. Buds 5–10 mm. long: lvs. ovate-oblong, slightly toothed above the middle or entire, 6–12 cm. long, acuminate, usually fulvous beneath: fr. with short broad spines; nuts 1–3. W. China. Intr. 1908.

CC. Lvs. serrate: brts. slender.

3. **C. Delavaÿi** Franch. Buds 2–4 mm. long: lvs. elliptic or elliptic-obovate to narrow-elliptic, 4–10 cm. long, acute or sometimes rounded at apex, whitish beneath: fr. with subulate spines; nut usually solitary. W. China. Intr. 1924.

AA. Fr. with transverse ridges of small tubercles: lvs. glabrous or thinly tomentulose beneath.

B. Lvs. 4–8 cm. long, usually entire.

4. **C. cuspidàta** Schottky. Lvs. ovate to oblong, long-acuminate, crenately serrate toward the apex or entire, with a thin grayish scaly tomentum beneath: frs. in short spikes, ovoid; cup enclosing the nut. S.I.1:t.34(c). N.K.3:t.8. G. C.III.12:233. (Q. *c.* Thunb., *Pasania c.* Oerst.) Japan. Intr. 1830.

BB. Lvs. 8–15 cm. long, usually serrate above the middle.

5. **C. sclerophýlla** Schottky. Lvs. oblong-ovate, acuminate, glaucescent beneath: frs. in dense spikes to 10 cm. long; cup ovoid, not wholly enclosing the solitary nut. Lindl. & Paxt., Fl.Gard.1:59,f.37. (*Quercus s.* Lindl., *Q. chinensis* Abel.) E. and C. China. Intr. 1849.

5. **LITHOCÁRPUS** Bl. Evergreen trees: buds with few foliaceous scales: lvs. dentate or entire, coriaceous: staminate fls. in upright simple or branched spikes with rudimentary ovary; calyx 4–6-lobed; stamens usually 10–12, much longer than the calyx; pistillate fls. at the base of the staminate spikes or in separate catkins; ovary 3-celled; styles 3, cylindric, stigmatic only at apex: fr. a nut, partly, rarely nearly wholly enclosed by a cup-like involucre, its scales distinct and imbricate or connate into concentric rings. (Greek *lithos*, stone, and *carpos*, fruit, alluding to the hard shell of the nut of the typical species, *L. javensis*.) Syn.: *Pasania* Oerst., *Cyclobalanus* Oerst., *Synaedrys* Lindl.—About 100 species in s. and e. Asia and in Malesia, one in W. N. Am.—Ornamental evergreen trees adapted only for warmer temperate regions.

L. densiflòra Rehd. Tanbark Oak. Evergreen tree to 25 or rarely 30 m.: brts. tomentose: lvs. oblong or oblong-obovate, acute, cuneate or rounded at base, dentate with callous teeth, 7–12 cm. long, rusty-tomentose beneath, becoming finally glabrate and bluish white; petioles stout, about 1.5 cm. long, tomentose; pistillate fls. at base of the staminate spikes: frs. 1–2 on a stout peduncle 1–2.5 cm. long; nut ovoid, 2–2.5 cm. long, embraced at base by the shallow cup covered with subulate spreading or reflexed scales. B.M. 8695(c). S.S.9:t.438. G.F.5:523(h). J.S.t.7(h). (*Quercus d.* Hook. & Arn., *Pasania d.* Oerst.) S. Ore. to Calif. Intr. 1874. Zone VIII?—Var. **echinoìdes** Rehd. Shrubby form with entire usually obtuse lvs. 3–5 cm. long. (*Quercus d.* var. *e.* Sarg.) S. Ore. to n. Calif. Intr.? Zone VII?

The following Asiatic species are in cult. and may be hardy in Zone VIII or even VII, but are as yet not or little known in this country. They all differ from *L. densiflora* in the appressed triangular scales of the cup.

A. Lvs. tomentose or tomentulose beneath.

B. Brts. pubescent: lvs. densely grayish tomentulose beneath.

1. **L. glâbra** Rehd. Lvs. elliptic-oblong to lanceolate, acuminate, cuneate at base, entire or rarely serrate toward the apex, 6–12 cm. long; acorn ovoid-oblong, about 2 cm. long. S.I.1:t.33(c). (*Quercus g.* Thunb., *Q. thalassica* Hance, *L. thalassica* Rehd.) E. China, Japan. Intr. ?

BB. Brts. glabrous: lvs. entire, thinly tomentose and finally glabrate beneath.

C. Lvs. glaucescent beneath; petioles 1–1.5 cm. long.

2. **L. cleistocárpa** Rehd. & Wils. Lvs. elliptic-oblong to oblong-lanceolate, acuminate, 6–12 cm. long: fr. subglobose, 2 cm. across, almost wholly enclosed by the cup. M.I.1:t.57. (*Quercus c.* Seemen, *Q. Wilsonii* Seemen.) C. and W. China. Intr. 1901.

CC. Lvs. green beneath; petioles 1.5–3 cm. long, on young plants shorter.

3. **L. Hénryi** Rehd. & Wils. Lvs. oblong-lanceolate, acuminate, 10–20 cm. long: cup saucer-shaped; acorn depressed-globose, about 2 cm. across. (*Quercus H.* Seemen.) C. China. Intr. 1901.

AA. Lvs. green and glabrous or short-pubescent beneath.

B. Lvs. entire; petioles stout, glabrous.

4. **L. edùlis** Rehd. Lvs. obovate-oblong to oblong, obtusely short-acuminate, 8–15 cm. long, glabrous beneath: acorn oblong-ovoid, about 2.5 cm. long, enclosed only at base by the cup. S.I.1:t.32(c). G.C.III.16:377(fr). (*Quercus e.* Mak., *Q. glabra* Sieb. & Zucc., not Thunb., *L. glabra* Rehd. in part.) Japan. Intr. 1842.

BB. Lvs. serrate above the middle; petioles slender, pubescent.

5. **L. córnea** Rehd. Lvs. oblong, acuminate, 5–10 cm. long or sometimes longer, pubescent on the veins beneath or rarely on the whole surface: acorn hemispheric, flat-topped, about 2.5 cm. across; cup turbinate, as high as acorn. H.I.2665. U.S.Inv.35:t.6(fr). U.S.Im.172:t.268(h). (*Quercus c.* Lour.) S. China. Intr. 1910.—Nut edible.

6. **QUÉRCUS** L. Oak. Deciduous or evergreen trees, rarely shrubs; buds with many imbricate scales: lvs. short-petioled, penninerved, serrate, dentate, lobed or pinnatifid, rarely entire: staminate fls. in slender pendulous catkins; calyx 4–7-parted; stamens 4–12, usually 6; pistillate fls. solitary or in 2 to many-flowered spikes; ovary 3-, rarely 4–5-celled; styles short or elongated, dilated above and stigmatic on the inner face; fr. a nut (acorn) subglobose to oblong or cylindric, surrounded at base or sometimes nearly inclosed by a cup-like involucre covered outside with imbricate scales or scales connate into concentric rings. (The ancient Latin name of the Oak-tree.) More than 200 species in the temp. regions of the n. hemisphere and in the tropics at high altitudes south to Colombia in America and to the Mal. Archipelago in Asia.—Much planted as ornamental trees on account of their handsome foliage assuming in most species brilliant autumnal tints. Many species are important timber trees and of some the acorns are edible.

I. Lvs. deciduous

A. Lvs. entire.
B. Under side of lvs. glabrous.
C. Lvs. lanceolate or linear-oblong, 1–1.5 cm. broad, light green. . . . . 2. *Q. Phellos*
CC. Lvs. oblong, about 2 cm. broad, dark green above. . . . . 4. *Q. laurifolia*
BB. Under side of lvs. pubescent, 2–5 cm. broad. . . . . 3. *Q. imbricaria*
AA. Lvs. toothed or lobed.
B. Lobes or teeth bristly pointed.
C. Lvs. lobed.
D. Lvs. obovate, 3–5-lobed at apex, glabrous or partly glabrous at maturity.
E. Lvs. obovate-spatulate, glabrous beneath. . . . . 5. *Q. nigra*
EE. Lvs. broadly obovate, more or less rusty pubescent beneath. . 6. *Q. marilandica*
DD. Lvs. elliptic to oblong, with 5–9, rarely only 3 lobes (if lvs. narrow, with few irregular lobes or partly entire, see hybrids under Nos. 2 and 3.)
E. Lvs. whitish or grayish tomentose beneath, lobes entire or occasionally with few teeth.
F. Lobes triangular.
G. Lvs. with usually 5 lobes; cup with appressed scales. . . . . 7. *Q. ilicifolia*
GG. Lvs. with 9–13 lobes; cup with spreading scales. . . . . 22. *Q. aegilops*
FF. Lobes narrow, often falcate. . . . . 8. *Q. falcata*
EE. Lvs. green beneath, glabrous or pubescent.
F. Lvs. pubescent beneath at least when young; upper scales of cup loosely imbricated.
G. Winter-buds tomentose; lvs. with axillary tufts of hairs beneath. 10. *Q. velutina*
GG. Winter-buds puberulous; lvs. without axillary tufts. . . . . 11. *Q. Kelloggii*
FF. Lvs. glabrous beneath.
G. Longest lobes of the lvs. 2–6 times as long as the narrow middle portion; lvs. lustrous.
H. Lvs. with conspicuous axillary tufts of hairs beneath.
I. Lvs. usually cuneate at base; acorn 8–13 mm. long; cup saucer-shaped. . . . . 15. *Q. palustris*
II. Lvs. usually truncate at base; acorn 1.5–2.5 cm. high.
J. Winter-buds chestnut-brown: cup turbinate, 1.2–1.8 cm. wide. 12. *Q. ellipsoidalis*
JJ. Winter-buds light yellowish or grayish brown: cup hemispheric or saucer-shaped, 1–3 cm. wide. . . . . 13. *Q. Shumardii*
HH. Lvs. with small axillary tufts; buds whitish pubescent above the middle; acorn inclosed about ½ by the cup. . . . . 14. *Q. coccinea*
GG. Longest lobes almost equaling the width of the broadish middle portion of the leaf; lvs. dull. . . . . 16. *Q. borealis*
CC. Lvs. serrate: cup with spreading or recurved scales.
D. Lvs. white-tomentose beneath. . . . . 18. *Q. variabilis*
DD. Lvs. glabrous beneath or pubescent only on the veins.
E. Lvs. glabrous beneath except axillary tufts of hairs, with 10–16 pairs of veins. 19. *Q. serrata*
EE. Lvs. pubescent on the veins beneath, with 9–12 pairs of veins. . . 21. *Q. libani*
BB. Lobes or teeth not bristly pointed, but sometimes mucronate.
C. Axillary and terminal buds with long filiform persistent stipules; brts. pubescent or tomentose.
D. Lvs. with 8–14 pairs of small triangular mucronate teeth; cup with subulate spreading scales. . . . . 20. *Q. castaneaefolia*
DD. Lvs. with 4–10 pairs of lobes.
E. Lvs. elliptic to oblong, 5–10 cm. long, lobes often acutish: cup with spreading subulate scales. . . . . 24. *Q. Cerris*
EE. Lvs. obovate, 10–14 cm. long: cup with appressed scales. . . . 36. *Q. macranthera*

cc. Axillary buds without persistent stipules: cup with appressed scales except No. 22.
d. Lvs. serrate or sinuately dentate.
e. Lvs. with small mucronate teeth.
f. Lvs. with 15–20 pairs of veins, 10–15 cm. long....34. *Q. pontica*
ff. Lvs. with 12 or less pairs of veins.
g. Lvs. short-stalked, usually broad at base.
h. Lvs. with 9–12 pairs of veins, acute at apex, auricled at base: cup with spreading scales....22. *Q. macedonica*
hh. Lvs. with 7–9 pairs of veins, usually obtuse at apex, broad-cuneate or rounded at base....33. *Q. lusitanica*
gg. Lvs. slender-stalked, cuneate at base, usually glaucous beneath. 56. *Q. glandulifera*
ee. Lvs. with rather large rounded or sometimes acute and gland-tipped teeth: cup with appressed scales except No. 58.
f. Brts. glabrous or nearly so.
g. Lvs. glabrous beneath at maturity or pubescent only on the veins or along the midrib.
h. Petioles very short; lvs. auricled at base, hairy on the veins beneath. 57. *Q. mongolica*
hh. Petioles 1–2.5 cm. long; lvs. with brown floccose tomentum along the midrib....35. *Q. Mirbeckii*
gg. Lvs. tomentose, tomentulose or soft-pubescent beneath.
h. Lvs. obovate to obovate-oblong.
i. Lvs. with 4–8 pairs of veins.
j. Lvs. 6–12 cm. long, with 4–7 pairs of veins and usually acute teeth: shrub....53. *Q. prinoides*
jj. Leaves 10–20 cm. long, with 6–8 pairs of veins: fr.-stalk much exceeding the petiole....50. *Q. bicolor*
ii. Lvs. with 10–17 pairs of veins: fr.-stalk short.
j. Petioles 1.5–3 cm. long; lvs. with 12–17 pairs of veins.
k. Lvs. dark green above, usually tomentose beneath: scales of cup free to the base....51. *Q. Prinus*
kk. Lvs. yellow green above, minutely downy beneath: scales of cup free only at tip....52. *Q. montana*
jj. Petioles 1–2 cm. long; lvs. with 10–15 pairs of veins..55. *Q. aliena*
hh. Lvs. lanceolate, acuminate....54. *Q. Muhlenbergii*
ff. Brts. pubescent: lvs. obovate, 12–30 cm. long....58. *Q. dentata*
dd. Lvs. deeply lobed or pinnatifid.
e. Brts. glabrous or nearly so.
f. Lvs. glabrous or slightly pubescent beneath.
g. Petioles less than 1 cm. long; lvs. usually auricled at base: fr. slender-stalked....41. *Q. robur*
gg. Petioles 1–2.5 cm. long; lvs. usually cuneate at base.
h. Lvs. glaucous or glaucescent beneath, 10–16 cm. long, with 3–4 pairs of lobes: fr. stalked....42. *Q. alba*
hh. Lvs. green beneath, 6–12 cm. long.
i. Lvs usually lobed less than halfway to the middle with 4–6 pairs of obtuse lobes: scales of cup not thickened....40. *Q. sessiliflora*
ii. Lvs. usually pinnatifid more than halfway to the middle, with 3–5 pairs of acute or acutish lobes: scales of cup thickened. 45. *Q. novo-mexicana*
ff. Lvs. pubescent or tomentose beneath.
g. Lvs. green beneath, soft-pubescent, 6–12 cm. long....46. *Q. utahensis*
gg. Lvs. white-tomentose beneath, sometimes green and soft-pubescent.
h. Lvs. usually sinuate-dentate, with 6–8 pairs of lobes, sometimes pinnatifid, 10–15 cm. long: cup much shorter than acorn....50. *Q. bicolor*
hh. Lvs. deeply pinnatifid, with 3–4 pairs of lobes, 15–20 cm. long: cup large, usually entirely inclosing the acorn....48. *Q. lyrata*
ee. Brts. pubescent or tomentose.
f. Lvs. 15–30 cm. long.
g. Lvs. pubescent and green beneath, sinuately lobed, short-stalked: cup with lanceolate spreading scales....58. *Q. dentata*
gg. Lvs. white-tomentose beneath, lyrate, deeply lobed below the middle: upper scales of cup subulate, forming a fringe....49. *Q. macrocarpa*
ff. Lvs. 5–15 cm. long: cup with small appressed scales.
g. Lvs. glabrous above or only sparingly stellate-hairy.
h. Lvs. auriculate at base, 10–18 cm. long, with usually dentate lobes. 37. *Q. conferta*
hh. Lvs. cuneate or rounded at base, rarely subcordate.
i. Petioles more than 1 cm. long; lvs. 10–15 cm. long...44. *Q. Garryana*
ii. Petioles 1 cm. or less long.
j. Lvs. soft-pubescent beneath, deeply pinnatifid, 8–12 cm. long. 46. *Q. utahensis*
jj. Lvs. usually tomentose beneath, rarely divided more than halfway to the middle, 5–10 cm. long....39. *Q. pubescens*
gg. Lvs. pubescent above.
h. Leaves usually 5-lobed, with broad sinuses and broad lobes, 10–14 cm. long....47. *Q. stellata*

HH. Lvs. 7–13-lobed.
I. Lobes of lvs. broadly ovate to obovate, obtuse, 6–10 cm. long: fr. subsessile, acorn elongated, conical.....43. *Q. lobata*
II. Lobes of lvs. ovate to ovate-lanceolate, acutish, 6–14 cm. long: fr. stalked; acorn subglobose or ovoid.....38. *Q. tozae*

II. Lvs. evergreen

A. Lvs. pubescent below.
B. Lvs. nearly sessile, subcordate at base, ovate or elliptic, fulvous-tomentose beneath. 28. *Q. aquifolioides*
BB. Lvs. petioled, cuneate to rounded at base, rarely subcordate.
C. Lvs. beneath with yellow or yellowish tomentum.
D. Lvs. orbicular to obovate, 3.5–5 cm. long, with prominent veins..27. *Q. alnifolia*
DD. Lvs. ovate or elliptic to ovate-oblong, 3–10 cm. long, finally glabrous and glaucous beneath.....31. *Q. chrysolepis*
CC. Lvs. beneath with white or grayish tomentum.
D. Lvs. entire or spinose-dentate, with 7–10 pairs of veins: bark scaly.
E. Lvs. usually oblong, obtuse, cuneate at base, rarely acute and rounded at base. 32. *Q. virginiana*
EE. Lvs. usually ovate to lanceolate, acute, usually rounded at base.....30. *Q. Ilex*
DD. Lvs. with mucronate teeth or lobes and with 5–7 pairs of veins.
E. Lvs. toothed, evergreen: bark corky.....25. *Q. suber*
EE. Lvs. lobed, half-evergreen: bark slightly corky.....26. *Q. hispanica*
AA. Lvs. glabrous beneath at maturity.
B. Lvs. acute or obtuse, 2.5–5, rarely to 7 cm. long.
C. Lvs. serrate, rounded at base.....29. *Q. phillyraeoides*
CC. Lvs. with spiny-tipped teeth, subcordate at base.
D. Lvs. 2–10 cm. long: scales of cup appressed.....17. *Q. agrifolia*
DD. Lvs. 1.5–5 cm. long: scales of cup spreading.....25. *Q. coccifera*
BB. Lvs. acuminate, 7–10 cm. long.....1. *Q. myrsinaefolia*

Subgen. I. CYCLOBALANOPSIS Prantl. Cupula with the scales connate into concentric rings: styles short; aborted ovules near the apex of the nut: lvs. evergreen, entire or dentate. (*Cyclobalanopsis* Oerst.)

1. **Q. myrsinaefòlia** Bl. Evergreen tree to 18 m.: lvs. lanceolate to oblong-lanceolate, 7–12 cm. long, 2–3 cm. broad, acuminate, cuneate at base, serrate, glabrous, lustrous above, glaucescent beneath: frs. in short spikes; acorn ovoid-oblong, 1.5–2 cm. long, inclosed about ⅓ by the glabrous cup. S.I. 1:t.29(c). N.K.3:t.25. (*Q. Vibreyana* Franch. & Sav., *Q. bambusaefolia* Fort., not Hance, *Cyclobalanopsis Vibreyana* Schottky.) Japan. Intr. 1854. Zone VIII.—Handsome evergreen oak which has been confused with *Q. acuta*, *Q. glauca* and *Lithocarpus glabra* (*Q. thalassica*).

The following species of this subgenus are in cult. and may be hardy in zone VIII, but have not yet been sufficiently tested:

Q. acùta Thunb. Small tree: lvs. oblong-ovate to oblong-lanceolate, 7–12 cm. long, rounded at base, entire and usually undulate, green and glabrous beneath: cup pubescent. S.I.1:t.32(c). N.K.3:t.22. Gn.79:388(h). (*Q. Buergeri* Bl.) Japan. Intr. 1877.—**Q. glaùca** Thunb. Tree to 15 m.: lvs. elliptic-oblong to ovate-oblong, 7–12 cm. long, cuneate or rounded at base, dentate above the middle, glaucous and silky beneath while young; petioles 1–2.5 cm. long: frs. few; cup silky-pubescent outside. S.I.1:t.30(c). I.T.4:t.103. Japan, China, Himal. Intr. before 1835 from Himal. and 1864 from Japan.—Var. **grâcilis** Rehd. & Wils. Lvs. narrower and smaller, ovate-oblong to lanceolate-oblong, less deeply serrate, 4.5–8 cm. long. C. China. Intr. 1907.—**Q. oxýodon** Miq. Half-evergreen tree: lvs. oblong, 6–16 cm. long, acuminate, rounded or cuneate at base, glaucescent beneath, with many prominent lateral veins: cup grayish tomentulose; its rings crenate. Ann. Bot. Gard. Calcutta, 2:t.26,f.3. (*Q. lineata* var. *o.* Wenz.) C. China, Assam. Intr. 1900.—Var. **Fargèsii** Rehd. & Wils. Rings of cup entire, its pubescence more yellowish. (*Q. F.* Franch.) W. China. Intr. ?—**Q. Delavaỳi** Franch. Small tree: young brts. and lvs. beneath yellowish tomentose; lvs. slender-petioled, ovate-oblong to lanceolate, 5–11 cm. long, acuminate, serrate usually only above the middle: cup yellowish or grayish tomentulose. S. W. China. Intr. about 1915.

Subgen. II. ERYTHROBALANUS Spach. Scales of cup not connate into rings, appressed; style elongated, capitate; aborted ovules near apex of fr.; walls of nut tomentose inside; fr. ripening the second year (except No. 17): lvs. deciduous or evergreen, lobed or entire, the lobes and apex bristle-pointed.

Sect. 1. PHELLOS Loud. Lvs. entire, oblong to lanceolate, involute in bud, changing to bright colors in autumn.

2. **Q. phéllos L.** Willow O. Tree to 20 m., rarely higher; brts. slender, reddish brown, glabrous; lvs. linear-oblong to lanceolate, acute at ends, 5–10 cm. long, lustrous above, pubescent below while young, glabrate at length and light green; fr. nearly sessile; acorn hemispherical, about 1 cm. high, inclosed only at base by the saucer-shaped cup. S.S.8:t.435. M.S.1:t.14(c). H.H.158,159(b). Am.For.27:461(h). J.L.45:207(h). N. Y. to Fla., w. to Mo. and Tex. Intr. 1723. Zone V.—Handsome tree with conical round topped head and willow-like lvs. turning pale yellow in autumn.

Q. p. × *borealis maxima* (or *velutina*?) = **Q. heterophýlla** Michx. Brts. glabrous: lvs. oblong to elliptic, with 3–5 pairs of teeth, or entire, glabrous beneath except axillary tufts of hairs. M.S.1:t.18(c). S.S.8:t.486. Proc. Staten Island Assoc. 7:t.4(h). N. J. to Tex. Cult. 1822.—*Q. p.* × *rubra* = **Q. ludoviciàna** Sarg. Lvs. oblong, 10–15 cm. long, usually with 3–4 triangular-ovate teeth or loebs near apex or entire, green and pubescent to glabrate beneath. (*Q. subfalcata* Trel.) With the parents. Intr.?—Var. **microcárpa** Rehd. Lvs. oblong-lanceolate, 7–9 cm. long, shallowly lobed. D.L.2:107. (*Q. phellos microcarpa* Hort., *Q. subfalcata* var. *m.* Sarg.) Cult. 1880. Zone V.—*Q. p.* × *palustris* = **Q. Schochiàna** Dieck. Lvs. oblong to narrow-oblong, usually with 1–3 teeth or lobes on each side, rarely entire, 6–12 cm. long, green and nearly glabrous beneath. Cult. 1896.

3. **Q. imbricària** Michx. Shingle O. Tree to 20, rarely to 30 m. tall, brts. slender, soon glabrous, light brown: lvs. oblong or oblong-lanceolate, acute or rounded at ends, 7–16 cm. long, with slightly thickened revolute margin, dark green and glabrous above, pale green or brownish and pubescent beneath; petioles 5–15 mm. long: fr. short-stalked; acorn hemispherical, 1–1.5 cm. high, inclosed ⅓ to ½ by the turbinate cup. S.S.8:t.432. M.S. 1:t.15(c). H.H.162,163(b). M.M.6:91(h). Pa. to Ga., w. to Neb. and Ark. Intr. 1786. Zone V.—Handsome tree of symmetrical habit, pyramidal while young, round-topped when old, with lustrous lvs. turning russet-red in autumn.

Q. i. × *velutina* = **Q. Leàna** Nutt. Brts. scurfy: lvs. sinuately toothed, rarely entire, rounded at base, 8–16 cm. long, scurfy beneath. N.S.1:t.5bis(c). S.S.8:t.434. With the parents. Intr. before 1850.—*Q. i.* × *palustris* = **Q. exácta** Trel. Brts. glabrous: lvs. oblong-lanceolate, coarsely toothed or entire, soon glabrous, 10–15 cm. long: cup turbinate. With the parents. Cult. 1889.— *Q. i.* × *borealis maxima* = **Q. runcinàta** Engelm. Lvs. slender-stalked, elliptic-oblong, 10–16 cm. long, with usually 3 lobes on each side, usually broad-cuneate to nearly rounded at base, glabrous and usually pale green beneath. With the parents. Intr. 1883.

4. **Q. laurifòlia** Michx. Laurel O. Tree to 20, rarely to 30 m.: brts. slender, glabrous, dark brown: lvs. oblong or oblong-obovate, 5–14 cm. long, acute or rarely rounded at ends, entire or sometimes slightly lobed, lustrous and dark green above, light green beneath, puberulous at first, soon glabrous; petioles yellow, 5–8 mm. long: fr. short-stalked; acorn subglobose to ovoid, 1–1.5 cm. long, inclosed only at base by the saucer-shaped cup. S.S. 8:t.429,430. M.S.1:t.15(c). H.H.160,161(b). F.E.16:396,t.62(h). Va. to Fla. and La. Intr. 1786. Zone VII–VIII?—Handsome tree with dense round-topped head and half-evergreen lustrous foliage; often planted as an avenue tree south. A good form is in the trade as "Darlington Oak."

Sect. 2. Nigrae Loud. Lvs. obovate, broadest above the middle, 3–5-lobed near apex or sometimes entire, convolute in bud.

5. **Q. nígra** L. Water O. Tree to 25 m.: lvs. obovate, 3-lobed at apex, or sometimes entire,[1] rarely pinnately lobed above the middle, 3–7 long, dull bluish green above, paler beneath, soon glabrous except axillary tufts of brown hairs; petioles 5–10 mm. long: frs. short-stalked; acorn globose-ovoid, 1–1.5 cm. long, inclosed ⅓ or ¼ by the saucer-shaped cup. S.S.8: t.428. M.S.1:t.19(c). H.H.156,157(b). E.H.5:t.312(h). (*Q. aquatica* Walt., *Q. uliginosa* Wangh.) Del. to Fla., w. to Ky. and Tex. Intr. 1723. Zone VI

or VII.—Handsome tree with rather slender brs. forming a conical round-topped head. Often planted as an avenue tree.

6. **Q. marilándica** Muenchh. Black-Jack. Tree to 10 or sometimes to 18 m. high: leaves broad-obovate, 10–20 cm. long, and often nearly as broad at apex, rounded at base, 3–5-lobed at apex, with broad, entire or sparingly toothed lobes, dark green and glabrous above, brownish tomentose beneath, finally nearly glabrous and yellowish green; petioles 1–2 cm. long: frs. short-stalked; acorn ovoid-oblong, 2 cm. high, often striate, inclosed ⅓ to ⅔ by the turbinate cup, its upper scales smaller and forming a thick rim round its inner surface, occasionally reflexed and covering the upper half of the inner surface. S.S.8:t.426, 427. M.S.t.20(c). H.H.154, 155(b). (*Q. nigra* Wangh., not L., *Q. ferruginea* Michx.) N. Y. to Fla., w. to Neb. and Tex. Intr. before 1739. Zone V or VI.—Tree with stout spreading brs. forming a narrow, often irregular head, with large lustrous foliage turning brown or yellow in autumn.

A closely related species is **Q. arkansana** Sarg. Lvs. broad-obovate, 5–8 cm. long, cuneate at base, slightly 3-lobed at apex, or on sterile branches elliptic to ovate, rounded at base and undulately lobed, stellate-pubescent beneath at first, later glabrous or nearly so: acorn broad-ovoid, 1.5 cm. across. S.T.2:t.152. Ark. Intr. 1909. Zone V.

Sect. 3. Rubrae Loud. Lvs. pinnately lobed, not broad at apex, lobes usually sinuately dentate with bristle-pointed teeth, convolute in bud, usually turning bright red in autumn or orange.

7. **Q. ilicifólia** Wangh. Scrub O. Intricately branched spreading shrub, to 3 m., rarely small tree to 7 m.; brts. hoary-pubescent: lvs. obovate or rarely oblong, 5–12 cm. long, broad-cuneate at base, sinuately lobed with usually 2 pairs of broad triangular lobes entire or with few bristly teeth, dark green and glabrous above, whitish tomentulose beneath; petioles 2–3.5 cm. long: fr. short-stalked; acorns globose-ovoid, about 1 cm. high, inclosed about ½ by the saucer-shaped cup. S.S.8:t.424. M.S.1:t.21(c). (*Q. Banisteri* Michx., *Q. nana* Sarg.) Me. to Va., w. to Ohio and Ky. Intr. about 1800. Zone V.—Densely branched spreading shrub with dull dark green foliage; useful for covering rocky slopes and barren ridges.

Q. i. × *coccinea* = **Q. Robbínsii** Trel. Lvs. 8–12 cm. long, with usually 3 pairs of lobes, slightly tomentose or often glabrescent at maturity beneath: acorns about 12 mm. long, inclosed about ½ by the cup. With the parents. Intr. 1913.—*Q. i.* × *velutina* = **Q. Rèhderi** Trel. Lvs. 8–10 cm. long, with 2–3 pairs of lobes, slightly tomentulose or glabrate at maturity beneath: cup with larger tomentulose scales. Rhodora,3:t.24. With the parents. Intr. about 1905.

8. **Q. rúbra** L. Spanish O. Tree to 25 or occasionally to 30 m.; brts. rusty-tomentose: lvs. elliptic-oblong or obovate, 8–20 cm. long, broad-cuneate or sometimes rounded at base, deeply sinuately lobed, with 3–7 acute lobes gradually narrowed from a broad base, often falcate, entire or repand-dentate, the terminal lobe elongated, dark green and glabrous above, tawny or grayish pubescent beneath, drooping; petioles 2.5–5 cm. long: fr. short-stalked; acorn subglobose, 1–1.5 cm. high, inclosed only at base or sometimes ⅓ by the saucer-shaped cup puberulous inside. S.S.8:t.420. M.S.1:t.23(c). G.F.8: 104(b). F.E.29:943(h). (*Q. falcata* Michx., *Q. digitata* Sudw., *Q. triloba* Michx., *Q. cuneata* auth., not Wangh.) N. J. to Fla., w. to Mo. and Tex. Intr. before 1763. Zone VI.—Handsome tree with stout spreading brs. forming an open round-topped head, with dark green deeply cut drooping foliage.—Var. **pagodaefólia** Ashe. Swamp Spanish O. Tree to 40 m.; brts. hoary-tomentose: lvs. usually rounded at base, less deeply lobed, with 5–11 broader lobes, white-tomentose beneath. S.S.14:t.772. (*Q. falcata* var. *p.* Ell., *Q. p.* Ashe.) Va. to Fla., w. to s. Ill. and Ark. Intr. 1904. Zone VII?

Q. r. × *phellos* = *Q. ludoviciana;* see under No. 2.

A related species is **Q. Catesbaèi** Michx. Tree to 20 m.: lvs. similar to those of *Q. rubra* but with short petioles 1–2 cm. long, at maturity lustrous and glabrous below: cup turbinate with the scales extending above the rim and down the inner surface. S.S.8:t.417. (? *Q. laevis* Walt.) N. C. to Fla. and La. Intr. about 1834. Zone VIII?

9. **Q. velutîna** Lam. Black O. Tree to 30 or occasionally to 50 m.; bark dark brown, inner bark orange; brts. scurfy-tomentose, glabrescent the first winter; buds pubescent: lvs. ovate to oblong, 10–25 cm. long, cuneate to truncate at base, sinuately lobed halfway to the middle or beyond, with 7–9 broad, repand-dentate lobes, lustrous dark green above, brown-pubescent beneath at first, finally often glabrous except in the axils of the veins; petioles stout, 3–6 cm. long, yellow: fr. short-stalked, acorn ovoid, 1.5–2 cm. high, often striate, inclosed about ½ by the turbinate cup, with loosely imbricated pubescent scales, the free tips of the upper scales forming a short fringe-like border. S.S.8:t.414, 415. M.S.1:t.24(c). H.H.148,149(b). Em.160,t(h). G.F.5:55(h). B.T.289(h). (*Q. tinctoria* Bartr.) Me. to Fla., w. to Minn. and Tex. Intr. about 1800. Zone IV.—Var. **missouriénsis** Sarg. Lvs. with permanent rusty pubescence beneath: cup-scales tomentose. W. Mo. to Ark. Intr. 1905. Zone V.—Large tree of rapid growth with rather slender brs. forming an open narrow head, and with handsome lustrous foliage turning dull red or orange-brown in autumn. The bark is used for tanning.

Q. v. × *phellos* = *Q. heterophylla;* see under No. 2.—*Q. v.* × *imbricaria* = *Q. Leana;* see under No. 3.—*Q. v.* × *ilicifolia* = *Q. Rehderi;* see under No. 7.

10. **Q. Kellóggii** Newb. Californian Black O. Tree to 30 m.: bark dark brown or nearly black; brts. hoary-tomentose, becoming usually glabrous during the first winter; buds puberulous or nearly glabrous: lvs. oblong, 8–15 cm. long, cuneate or truncate at base, sinuately 7- or rarely 5-lobed about halfway to the middle, with oblong repand-dentate lobes, pubescent at first, at maturity thick and firm, glabrous and lustrous above, glabrous or pubescent beneath or sometimes hoary-tomentose; petioles slender, 3–5 cm. long: fr. short-stalked; acorn ovoid-oblong, 2.5–3.5 cm. long, inclosed about ¼ or ⅔ by the deep cup-shaped cup with glabrous loosely imbricated scales. S.S.8:t.416. G.F.9:145(h). (*Q. californica* Coop.) Ore. to Calif. Intr. 1878. Zone VII or VIII?—Handsome tree with stout spreading brs. forming an open round-topped head.

11. **Q. ellipsoidàlis** E. J. Hill. Tree to 25 m.; bark gray, close and smooth or shallowly fissured; brts. tomentose at first; buds slightly puberulous: lvs. elliptic, 8–12 cm. long, truncate to broad-cuneate at base, deeply sinuately 5–6-lobed, with oblong, coarsely repand-dentate lobes, soon glabrous except axillary tufts beneath; petioles 3–5 cm. long: fr. short-stalked or nearly sessile; acorn ellipsoid to subglobose, 1.2–2 cm. long, inclosed ⅓ or nearly ½ by the turbinate cup with closely appressed pale brown-puberulent scales. S.S.14:t.771. H.H.144,145(b). S. Mich. to Man. and Ia. Intr. 1902. Zone IV or III?—Medium sized tree similar to the Pin Oak in habit.

12. **Q. Shumârdii** Buckl. Tree to 40 m.; bark gray or reddish brown, broken into small scaly plates; brts. glabrous; buds glabrous, rarely pubescent: lvs. obovate to elliptic-oblong, 8–18 cm. long, 5–9-lobed, on the lower brs. usually 7-lobed, with broad, rather short lobes, on the upper brs. 7–9-lobed and deeply divided by broad sinuses more than halfway to the middle, lobes toothed and often lobulate, dark green and lustrous above, lighter green beneath, with conspicuous axillary tufts of hairs; petioles 4–6 cm. long: fr. short-stalked or subsessile; acorn ovoid to oblong-ovoid, 1.5–3 cm. long, inclosed only at base by the saucer-shaped cup sometimes to 3 cm. across

and covered with appressed often tuberculate scales. S.M.243. (*Q. texana* var. *S.* Sarg.) N. C. to Fla., Okla., Kans. and s. Mich. Intr. 1907. Zone V. —Handsome tree with widespreading brs., resembling *Q. coccinea* in foliage and *Q. borealis maxima* in fr.—Var. **Schnéckii** Sarg. Fr. with deep cup-shaped cup, inclosing about ⅓ of the nut, with usually thin, rarely tuberculate scales. S.S.8:t.411(excl.f.5–7). S.M.244. G.F.7:515. (*Q. S.* Brit., *Q. texana* var. *S.* Sarg., *Q. texana* Sarg., in part.) Ky. to Ala. and Tex. Intr. 1897.

The closely related **Q. texàna** Buckl. is a smaller tree, to 10 m.; buds pubescent; lvs. not dimorphous, smaller, 6–9 cm. long, usually 5-lobed, rarely with small axillary tufts of hairs beneath: acorn smaller; cup turbinate. S.M.245. G.F.7:517. Texas. Probably not hardy.

13. **Q. coccínea** Muenchh. Scarlet O. Tree to 25 m.; bark gray, the inner reddish; brts. soon glabrous becoming orange-red; buds dark reddish brown, pubescent above the middle: lvs. oblong or elliptic, 8–15 cm. long, truncate or rarely broadly cuneate at base, sinuately pinnatifid, with 7, rarely 9, oblong, sparingly repand-dentate lobes, bright green and glabrous beneath except small axillary tufts of rusty hairs; petioles slender, 3–6 m. long: fr. short-stalked; acorn ovoid, 1.3–2 cm. long, inclosed about ⅓–½ by the turbinate or hemispheric cup with rather large appressed and glabrate scales. S.S.8:t.412,413. M.S.1:t.25(c). Em.1:164,t.(c). H.H.146,147(b). Me. to Fla., w. to Minn. and Mo. Intr. 1691. Zone IV. Handsome tree with gradually spreading brs. forming a round-topped, rather open head, and with handsome bright green foliage turning brilliant scarlet in autumn.

Q. c. × *borealis maxima* = **Q. Bénderi** Baenitz. Buds and lvs. intermediate: cup turbinate. Orig. in Eu. before 1900; also spont. with the parents.—*Q. c.* × *ilicifolia* = *Q. Robbinsii;* see under No. 7.

14. **Q. palústris** L. Pin O. Tree to 25 or occasionally to 40 m.; brts. soon glabrous, becoming dark red-brown or orange; buds chestnut-brown, glabrate: lvs. elliptic or elliptic-oblong, 8–12 cm. long, usually cuneate at base, sinuately pinnatifid, with 5–7 oblong to oblong-lanceolate repand-dentate lobes, bright green above, lighter green, lustrous and glabrous beneath except axillary tufts of hairs; petioles slender, 2–5 cm. long: fr. sessile or short-stalked; acorn nearly hemispheric, 1–1.5 cm. across, inclosed about ⅓ by the thin saucer-shaped cup; scales closely appressed, puberulous. S.S.8:t.422,423. M.S.1:t. 27(c). R.H.1921:438,t(c). Em.167,t(h). B.T.284(h). Mass. to Del., w. to Wis. and Ark. Intr. before 1770. Zone V.—Handsome tree with slender brs., usually pendulous at the ends, forming a symmetrical pyramidal head while young, irregular and oblong in older trees. Of rapid growth while young and often used for avenues.

Q. p. × *borealis maxima* = **Q. Ríchteri** Baenitz. Lvs. deeply lobed with 4–5 pairs of lobes, cuneate at base: cup saucer-shaped. Orig. before 1900 in Eu.; also spont. with the parents.—*Q. p.* × *phellos* = *Q. Schochiana;* see under No. 2.—*Q. p.* × *imbricaria* = *Q. exacta;* see under No. 3.

A related species is **Q. georgiàna** M. A. Curt. Shrub to 3 m. or small tree: lvs. smaller, less deeply lobed, the lobes entire or with 1 or 2 small teeth: cup thick, cup-shaped. S.S.8:t.425. Ga. Intr. 1876. Zone V.

15. **Q. boreàlis** Michx. Red O. Tree to 20 or 25 m.; brts. soon glabrous, becoming dark red; buds glabrous except at apex: lvs. oblong, 12–22 cm. long, usually cuneate at the base, sinuately 7–11-lobed about halfway to the middle, lobes triangular-ovate or ovate-oblong, with a few irregular teeth, dull green above, grayish or whitish or sometimes pale yellow-green beneath and glabrous except axillary tufts of brownish hairs; petioles 2–5 cm. long: fr. short-stalked; acorn ovoid, 2–2.5 cm. high; cup turbinate or hemispheric, inclosing the acorn about ⅓, 1.5–2 cm. across, with closely appressed puberulous scales. M.S.

1:t.26(c). S.M.241. (*Q. ambigua* Michx., not H.B.K., *Q. rubra* var. *ambigua* Fern.) N. S. to Pa., w. to Minn. and Iowa. Intr. 1800. Zone IV.—Var. **máxima** Sarg. Tree to 25 or occasionally to 50 m.; fr. larger; acorn 2.5–3 cm. high; cup inclosed only at base by the saucer-shaped cup 2.5–3 cm. broad. S.S.8:t.409, 410. M.S.1:t.28(c). H.H.138, 139(b). Em.168,t(h). E.H.5:t. 314(h). (*Q. rubra* Duroi, not L., *Q. m.* Ashe.) N. S. to Fla., w. to Minn. and Tex. Intr. 1691.—Beautiful Oak of rapid growth with stout spreading brs. forming a broad round-topped head and with large handsome foliage turning dark red in autumn. Often planted as shade and avenue tree.

Q. b. m. × *imbricaria* = *Q. runcinata;* see under No. 3.—*Q. b. m.* × *coccinea* = *Q. Benderi;* see under No. 13.—*Q. b. m.* × *palustris* = *Q. Richteri;* see under No. 14.

Sect. 4. STENOCARPAEA Oerst. Lvs. evergreen, entire or sinuately toothed, usually revolute in bud: acorn usually narrow and acute: fr. maturing the first year.

16. **Q. agrifòlia** Née. Evergreen tree to 30 m., often shrubby; brts. tomentose: lvs. broad-elliptic to elliptic-oblong, 3–7 cm. long, acute or rounded at apex, usually rounded at base, sinuately spiny-toothed, rarely entire, usually convex, dark green above, paler and rather lustrous beneath, glabrous and with axillary tufts of hairs or stellate-pubescent, subcoriaceous: fr. sessile; acorn conic-ovoid, usually elongated, 2–3.5 cm. long, inclosed ¼–⅓ by the turbinate cup, silky-pubescent inside, puberulous outside. S.S.8:t.403. N.S. 1:t.2(c). B.C.5:f.3321,3322. J.S.t.71(h).—Calif. Intr. 1849. Zone VIII?

The related **Q. hypoleùca** Engelm. with oblong-lanceolate, entire lvs. white-tomentose beneath and 5–10 cm. long, is probably of the same hardiness. W. Tex. to s. Ariz. Intr. ?

Subgen. III. LEPIDOBALANUS Endl. Cup with the scales not connate into rings, appressed or spreading: aborted ovules near base of fr.; walls of nut glabrous inside (except in No. 31); fr. ripening the first or second year.

Sect. 5. CERRIS Oerst. Styles linear, acute, upright or recurved; scales of cup spreading or recurved; fr. biennial: lvs. deciduous, rarely half-evergreen.

17. **Q. variàbilis** Bl. Tree to 25 m.; bark yellowish gray, corky, deeply furrowed; brts. soon glabrous; buds acute: lvs. oblong to oblong-lanceolate, 8–15 cm. long, acuminate, usually broad-cuneate at base, crenately serrate with bristle-like teeth terminating the 9–16 pairs of parallel veins, dark green and glabrous above, white-tomentose beneath; petioles 5–25 mm. long: fr. nearly sessile; acorn subglobose or globose-ovoid, 1.5–2 cm. long, little longer than the cup; scales subulate, recurved. S.I.1:t.28(c). N.K.3:t.10. (*Q. chinensis* Bge., not Abel, *Q. Bungeana* Forb., *Q. serrata* Carruthers, not Thunb.) N. China, Korea, Japan. Intr. 1861. Zone V.—Handsome tree with distinct foliage resembling that of *Castanea crenata.*

18. **Q. serràta** Thunb. Tree to 15 m.; brts. glabrous: lvs. obovate-oblong to oblong, acute, 8–18 cm. long, broad-cuneate or rounded at base, serrate with bristle-like teeth terminating the 12–16 parallel veins, lustrous and glabrous above, light green and glabrous beneath except axillary tufts of hairs, pubescent only when unfolding; petioles 1.5–2.5 cm. long: fr. sessile; cup with long, spreading and recurving scales, inclosing about ⅔ of the nut. S.I.1:t.26(c). N.K.3:t.9. (*Q. acutissima* Carruthers.) Japan, Korea, China, Himal. Intr. 1862. Zone VI?—Tree with handsome chestnut-like foliage.

A related species is **Q. Barònii** Skan. Half-evergreen shrub or small tree: lvs. short-stalked, ovate-oblong to lanceolate-oblong, 4–6 cm. long, with 5–7 pairs of small bristly teeth, glabrous or nearly so beneath except the tomentose midrib. W. China. B.J.29:291. Intr. 1914 or 1915. Zone VII?

19. **Q. castaneaefòlia** C. A. Mey. Tree to 25 m.; brts. tomentulose at first, later glabrous; stipules persistent: lvs. elliptic-oblong to oblong-lanceolate, 7–16 cm. long, acute, cuneate or rounded at base, coarsely serrate with

mucronate teeth, dark green above, grayish tomentulose or pubescent, rarely nearly glabrous beneath, with 6–12 pairs of veins; petioles 1.5–2.5 cm. long: fr. subsessile; acorn ovoid, 2–3 cm. long, inclosed ⅓ to ½ by the cup-shaped cup; scales recurved, the lower ones ovate. Kotschy, Eich.t.40(c). B.S.2:304,t(h). J.L.45:164(h). Cauc., Persia. Intr. about 1840. Zone VI?—Var. **incàna** Batt. Tree of erect pyramidal habit with smaller comparatively broader lvs. 6–12 cm. long. E.H.5:t.323(h). (Var. *algeriensis* Bean, *Q. afares* Pomel.) N. Afr. Intr. 1869. Zone VII?—Ornamental tree with spreading brs. forming a broad round head and with handsome chestnut-like foliage.

20. **Q. líbani** Oliv. LEBANON O. Tree to 10 m.; brts. soon glabrous: lvs. oblong-lanceolate, 5–10 cm. long, acuminate, rounded at base, serrate with bristle-tipped triangular teeth terminating the 9–12 pairs of veins, glabrous and dark green above, light green beneath and sparingly pubescent on the nerves or finely short-pubescent all over; petioles 1–1.5 cm. long: frs. 1–2 on thick stalks about 1.5 cm. long; acorn broad-ovoid, about 2.5 cm. across, inclosed about ⅔ by the large cup with loosely appressed upright scales. B.S. 2:315. R.H.1872:155. S.L.307(h),308. Syria, Asia Min. Intr. 1855. Zone V?—Handsome small tree.—Var. *angustifolia* Dipp. is scarcely distinct.

21. **Q. macedónica** A. DC. Half-evergreen tree to 10 m. or shrubby; brts. scurfy: lvs. ovate-oblong to oblong, 3–7 cm. long, acute, usually rounded at base, sinuately toothed with mucronate teeth, terminating the 8–12 parallel veins, lustrous dark green above, light beneath, sparingly stellate-pubescent while young, finally nearly glabrous; petioles 2–4 mm. long: acorn ovoid, 2.5–3.5 cm. high, inclosed more than ½ by the large cup with the lower scales ovate and appressed, the middle ones recurved and the upper ones lanceolate and upright or inversed. H.W.2:83. S.H.1:f.170a. S.L.310(h). Maced., Albania. Intr. about 1890. Zone VI?—Handsome small tree or shrub with bright green rather small half-evergreen lvs.

22. **Q. aègilops** L. Tree to 25 m.; brts. yellowish tomentose: lvs. elliptic to oblong, 5–10 cm. long, acute, usually subcordate at base, with 3–6 pairs of triangular, entire, bristle-tipped lobes, at first yellowish tomentose, finally glabrate above; petioles 1.5–3 cm. long: fr. sessile; acorn to 4.5 cm. long, inclosed ⅓ to ½ by the cup-shaped cup 3–4 cm. across; scales large and thickened, the upper ones narrower and reflexed. Kotschy, Eich.t.30(c, as *Q. graeca*). S.H.1:f.108m(l). E.H.5:t.322(h). S. Italy, Balk. Pen., W. Asia. Intr. 1731. Zone VIII?—Var. **Pỳrami** Boiss. Lvs. obovate, sometimes lyrate, with a deep sinus on each side below the middle, dull gray and stellate-pubescent beneath. Kotschy, Eich.t.3(c). Cilicia. Intr. before 1890.

23. **Q. Cérris** L. TURKEY O. Tree to 35 m.; bark dark, furrowed; brts. usually tomentose; buds ovoid, pubescent, surrounded by subulate persistent stipules; lvs. narrow-oblong to obovate-oblong, 6–12 cm. long, acute, rounded or subcordate at base, with 4–9 pairs of mucronate lobes entire or with 1–4 small teeth, dark green and somewhat rough above, light green beneath and stellate-pubescent at first, finally pubescent only on the nerves; petioles 1–2 cm. long: frs. subsessile, 1–4; acorn oblong-ovoid, 2.5–3 cm. high, inclosed about ½ by the cup-shaped cup covered with subulate recurved scales. H.W.2:74–76,t.25(c). Gn.27:476, 477. F.E.14:1264,t.41(h). E.H.5:t.316–318(h). S. Eu., W. Asia. Intr. 1735. Zone VI.—Var. **laciniàta** Loud. Lvs. pinnatifid, with acute, usually dentate lobes. S.H.1:f.110c.—Var. **péndula** Loud. Brs. pendulous; lvs. pinnatifid.—Var. **austríaca** Loud. Lvs. shallowly lobed, with broad triangular obtusish and mucronate lobes. Kotschy, Eich.t.

20(c). S.H.1:f.110b,d.—Var. **Ambrozyàna** Aschers. & Graebn. Stipules caducous; lvs. smaller, half-evergreen, glabrous above, with bristly teeth. Hungary. Cult. 1909.—Ornamental tree with spreading and slender, rather short brs. forming a broad pyramidal head, and with handsome dark green foliage turning brown late in autumn.

Q. C. × *suber* = *Q. hispanica;* see No. 26.

Sect. 6. Suber Prantl. Styles linear, acutish, upright or recurved; cup with recurved or loosely appressed scales: fr. ripening the first or second year: lvs. evergreen.

24. **Q. coccífera** L. Kermes O. Evergreen shrub or small tree: young brts. stellate-pubescent, finally glabrous: buds small, brown, nearly glabrous: lvs. rigid, broad-elliptic to ovate-oblong, 1.5–4 cm. long, spiny-pointed, rounded or subcordate at base, undulate and with 2–5 spiny teeth on each side, lustrous and glabrous on both sides; petioles 2–4 mm. long: fr. biennial, short-stalked; cup cup-shaped with short spreading spiny scales, inclosing more than ½ of the subglobose or ovoid acorn 1.5–3 cm. long. H.W.2:82,t. 25(c). R.I.12:t.643(c). B.S.2:306. S. Eu., W. Asia, N. Afr. Intr. 1683. Zone VIII?—Var. **pseudococcífera** A.DC. Tree with larger, flatter lvs. and larger fr. W. Asia.—Handsome evergreen shrub with small lustrous lvs.; the host plant of the kermes insect.

25. **Q. sŭber** L. Cork O. Evergreen tree to 20 m.; bark thick and corky, deeply furrowed; brts. yellow-tomentose: lvs. ovate to ovate-oblong, 3–7 cm. long, acute, rounded or subcordate at base, with 4–5 pairs of short teeth, rarely nearly entire, lustrous dark green above, grayish tomentose beneath, rarely glabrescent; petioles 8–15 mm.: fr. short-stalked, annual: acorn ovoid-oblong, 1.5–3 cm. long; cup cup-shaped, its upper scales elongated, upright or sometimes spreading. M.S.1:t.13(c). Kotschy, Eich.t.33(c). H.W.2:80, 81(h). E.H.5:t.328(h). Am. For.19:525, 527(h). S. Eu., N. Afr. Intr. 1699. Zone VIII?—Var. **occidentàlis** Arcang. Lvs. usually falling in spring; frs. biennial. (*Q. o.* Gay.) S. W. Eu. Intr. about 1826. Zone VIII?; said to be hardier than the type.—Tree with broad round-topped head and short trunk; the thick corky bark is the source of the cork of commerce.

26. × **Q. hispànica** Lam. (*Q. Cerris* × *suber.*) Half-evergreen tree to 30 m. or shrub; bark thick, slightly corky; brts. tomentose: lvs. subcoriaceous, ovate-oblong to oblong, 4–10 cm. long, acute, usually rounded at base, with 4–7 pairs of short triangular, mucronate lobes, sparingly pubescent and dark green above, grayish tomentose beneath; petioles 5–10 mm. long: fr. subsessile, biennial; acorn ovoid-oblong; cup large, with stout recurved scales. Kotschy, Eich.t.35(c). H.W.2:82. S.H.1:f.113c-h. (*Q. pseudosuber* Santi.) Sparingly with the parents in S. France, Italy, Balkan Pen. Intr. 1830. Zone VII–VIII?—The same cross has originated repeatedly in cult. and has given rise to several distinct variations:

Var. **Lucombeàna** Rehd. Pyramidal tree 30 m., with corky bark: lvs. generally longer and narrower and usually more deeply toothed than in the type. S.H.1:f.119c. L.A.3:1852,1853(h). B.S.2:316,t(h). J.L.45:187(h) (*Q. L.* Sweet, *Q. Cerris* var. *L.* Loud., *Q. exoniensis* Lodd., *Q. pseudosuber* var. *aegylopifola* DC.) Orig. about 1765 in England.—Var. **crìspa** Rehd. Bark very corky; lvs. smaller, 5–8 cm. long, with wrinkled margin, densely white-tomentose beneath. L.A.3:f.1715,1717c,1718(h). (*Q. Cerris* var. *c.*, Loud., *Q. Lucombeana* var. *c.* Henry.)—Var. **heterophýlla** Rehd. Lvs. oblong, irregularly and deeply lobed, occasionally in the middle with a deep wide sinus on each side: scales of the turbinate cup mostly short. L.A.3:f.1719.

(*Q. Lucombeana* var. *h.* Henry.)—Var. **diversifòlia** Rehd. Smaller tree with ascending brs. and very corky bark: lvs. about 5 cm. long and 2 cm. or less wide, usually in the middle with a deep wide sinus on each side, the lower portion with 1–4 lobes, the upper entire or toothed, white tomentose beneath, subcoriaceous: cup hemispheric, with short partly appressed scales. E.H.5: t.339,f.71. (*Q. Ilex* var. *d.* Nichols., *Q. Lucombeana* var. *d.* Henry.)—Var. **dentàta** Rehd. FULHAM O. Tree with slenderer brs.; bark less corky: lvs. smaller and broader than those of var. *Lucombeana*, about 8 cm. long and 3.5 cm. broad, rounded and occasionally auricled at base, white-tomentose beneath. W.D.2:t.93(c). E.H.5:t.319(h),335,f.21. (*Q. Cerris* var. *d.* Wats., *Q. Cerris* var. *fulhamensis* Loud., *Q. Lucombeana* var. *f.* Henry.)—Var. **latifòlia** Rehd. Lvs. broader, elliptic, about 9 cm. long and 6 cm. broad, obtuse at apex, with broad shallow teeth, grayish tomentose beneath. (*Q. Lucombeana* var. *fulhamensis l.* Henry.)

27. **Q. alnifòlia** Poech. Evergreen shrub or small tree; brts. with yellowish gray pubescence: lvs. orbicular or broad-obovate to elliptic, 2.5–5 cm. long, with few small teeth and 5–8 pairs of prominent veins, the margins of older lvs. deflexed, lustrous dark green above, yellowish or grayish tomentose beneath; petioles pubescent, 5–10 mm. long: cup with lanceolate recurved pubescent scales, inclosing about ½ of the obovoid-oblong (club-shaped) pointed acorn 2.5–3.5 cm. long. Kotschy, Eich.t.6(c). Gn.40:95. A.G.13:436. Cyprus. Intr. 1885. Zone VIII?—A very handsome evergreen shrubby Oak.

28. **Q. aquifolioìdes** Rehd. & Wils. Evergreen shrub or small tree to 10 m.; brts. pilose: lvs. nearly sessile, ovate or elliptic, 3–7.5 cm. long, subcordate at base, sinuately spiny-dentate, rarely entire, lustrous above, yellowish brown-tomentose beneath: fr. stalked, biennial; acorn ovoid, 1.2–1.5 cm. high, inclosed about ⅓ by the cup-shaped cup; scales free, linear-lanceolate, loosely appressed. W. China. Intr. 1910? Zone VII?—Var. **rufèscens** Rehd. & Wils. Lvs. thinner, with looser tomentum beneath, grayish on young, yellowish or brownish gray on older lvs., finally often disappearing entirely. W. China. Intr. 1908. Zone VII?

A closely related species is **Q. semecarpifòlia** Sm. Tree to 30 m.: lvs. elliptic, Spiny-toothed or undulate and entire, about 7 cm. long, stellate-pubescent beneath, falling mostly the second summer: fr. annual. E.H.5:t.338,f.53(l). C.C.102. Brandis, For. Fl. t.64. Himal., w. China. Intr. 1900. Zone VIII?—Into this affinity belong probably also the two following species:

Q. Gilliàna Rehd. & Wils. Evergreen small tree to 7 m. or shrubby: lvs. subsessile, elliptic, rounded at the spiny-pointed apex, 2.5–5 cm. long, subcordate or rounded at base, glabrous at maturity: fr. sessile, annual; acorn ovoid, about 1.2 cm. long, inclosed nearly ½ by the cup. W. China. Intr. 1910. Zone VIII?—**Q. Engleriàna** Seemen. Evergreen tree to 10 m.: lvs. ovate, 6–12 cm. long, acuminate, rounded at base, with few spiny appressed teeth, glabrous at maturity; petioles about 1 cm. long: frs. short-stalked; acorn ovoid, 1 cm. long, cup with thin glabrescent scales. Icon. Pl. Koisikav. 1:t.56. (*Q. sutchuenensis* Franch., *Q. obscura* Seem.) C. and W. China. Intr. 1900. Zone VIII?

Sect. 7. ILEX Oerst. Styles short, dilated toward the rounded apex: cup with appressed scales; fr. usually annual: lvs. evergreen, often entire, coriaceous.

29. **Q. phillyraeoìdes** Gray. Evergreen shrub or tree to 10 m.; brts. stellate-pubescent: lvs. broad-elliptic to obovate-oblong, 2.5–6.cm. long, obtuse or acute, rounded or subcordate at base, crenately serrate except at base, glabrous except on the midrib above and at its base below, with about 8 pairs of inconspicuous veins; petioles 2–5 mm. long: fr. subsessile, biennial; cup tomentose within and without; acorn ovoid, 1.3–2 cm. high. S.I.1:t.31(c). (*Q. Ilex* var. *p.* Franch.) Japan, C. and E. China. Intr. about 1862. Zone VIII?

30. **Q. Ìlex** L. Holm O. Evergreen tree to 20 m.; bark gray, nearly smooth or finally scaly; brts. tomentose: lvs. ovate to lanceolate, 3–7 cm. long, acute, usually rounded at base, remotely serrate or entire, lustrous dark green and glabrescent above, yellowish or whitish tomentose beneath, rarely glabrescent; petioles 6–15 mm. long: frs. 1–3, usually stalked; acorn ovoid, 2–3.5 cm. high, inclosed about ½ by the cup-shaped or turbinate cup with thin appressed scales. H.W.2:78,79,t.25(c). Kotschy, Eich.t.38(c). E.H.5:t.324–326(h). Gn.65:320. M.G.1898:275(h). S. Eu. Intr. before 1580. Zone VIII?—Var. **angustifòlia** Lam. Lvs. narrow, lanceolate, entire or nearly so. S.H.1:f.118d.—Var. **Fórdii** Nichols. Of pyramidal habit; lvs. narrow oblong, acute at both ends. R.H.1885:352, 353.—Var. **rotundifòlia** Rehd. Lvs. suborbicular to ovate, rounded at base, entire or remotely serrate. (Var. *ballota* A. DC., *Q. r.* Lam.)—Var. **microphýlla** Aschers. & Graebn. Lvs. very small, to 1 cm. long, serrulate.—Var. **crispa** Bean. Lvs. small, orbicular, 1–1.5 cm. long, with decurved margin.—Var. **gramúntia** Loud. Lvs. suborbicular to broad-elliptic, often subcordate, with slender spiny teeth, 2.5–5 cm. long. (*Q. g.* L.)—Evergreen ornamental tree with broad round head and dense dark green foliage; one of the hardiest of the evergreen Oaks. The acorns of var. *rotundifolia* are edible.

Q. I. × *sessiliflora*? = **Q. andleyénsis** Henry. Tree with subcoriaceous deciduous lvs. entire or sinuately lobed. E.H.5:t:338,f.59,t.327(h).—*Q. I.* × *robur* = *Q. Turneri;* see under No. 41.

31. **Q. chrysólepis** Liebm. Californian Live O. Evergreen tree to 20, rarely to 30 m.; brts. fulvous-tomentose: lvs. short-petioled, elliptic to oblong-ovate, 3–10 cm. long, acute, broad-cuneate to cordate at base, sinuately spiny-dentate or entire with revolute thick margins, bright green and glabrous above, glaucous and fulvous-tomentose beneath, coriaceous; petioles 3–10 mm. long, yellow: fr. sessile or short-stalked, acorn ovoid to ovoid-oblong, 1.5–5 cm. long; cup cup-shaped or turbinate, broad-rimmed, with small hoary-pubescent scales often hidden by a thick fulvous tomentum. S.S.8:t. 398, 399. G.F.5:127(h). S. Ore. to L. Calif. Intr. 1877. Zone VIII?—Var. **vacciniifòlia** Engelm. Prostrate shrub with small narrow lvs., small acorns and shallow thin cup with slightly pubescent scales. S.S.8:t.400. (*Q. v.* Kellogg.) Calif., high altitudes. Intr. about 1895; probably hardier than the type.—Beautiful evergreen tree with widespreading head and often pendulous brs.

32. **Q. virginiàna** Mill. Live O. Evergreen tree to 20 m.; brts. tomentose: lvs. elliptic to oblong, 4–12 cm. long, obtuse or rarely acute, usually entire rarely with a few spiny teeth above the middle, with revolute margin, lustrous dark green above, whitish tomentulose beneath; petioles stout, 5–10 mm. long: frs. 1–5, on peduncles 1–8 cm. long; acorn ovoid, about 2.5 cm. long, inclosed about ¼ by the turbinate cup with thin appressed hoary-tomentose scales. S.S.8:t.394, 395. M.S.1:t.12(c). H.H.180, 181(b). G.F.5:486(h); 8:235(h). Gg.8:1(h). (*Q. virens* Ait.) Va. to Fla., w. to Mex. Intr. 1739. Zone VIII?—Beautiful evergreen tree with nearly horizontal limbs forming a widespreading head; often planted as an avenue tree in the southeastern states; easily transplanted and of rapid growth.

To this group also belong the following species:

Q. reticulàta H. B. K. Evergreen shrub or small tree to 12 m.; brts. tomentose: lvs. broad-elliptic or obovate, 4–12 cm. long, usually obtuse, rounded or cordate at base, remotely spiny-dentate, fulvous-tomentose and reticulate beneath: frs. usually several on slender stalks; acorn 1–1.5 cm. long, inclosed about ¼ by the hoary-tomentose cup. S.S.8:t.390. S. Ariz. and N. Mex., Mex. Cult. 1883. Zone VIII?—**Q. obtusàta** H. B. K. Large tree; brts. glabrous: lvs. obovate, 5–12

cm. long, obtuse, cuneate at base, irregularly and sinuately toothed, glabrous, glaucescent and reticulate beneath, falling in spring: frs. stalked; acorn inclosed about ⅓ by the pubescent cup. E.H.5:t.333,f.4(l). J.L.41:8,f.5(h). Mex. Intr. before 1839. Zone VIII?—*Q. dumosa* Nutt., *Q. Emoryi* Torr. and *Q. oblongifolia* Torr. are scarcely known in cult. and probably not hardy within our area.

Sect. 8. Gallifera Spach. Like the preceding group, but lvs. thin, deciduous or persistent only until spring, usually coarsely dentate or lobulate.

33. **Q. lusitànica** Lam. Lusitanian O. Deciduous shrub or tree to 20 m., with rough scaly bark; brts. pubescent: lvs. usually elliptic or obovate, 5–8 cm. long, obtuse or pointed, rounded at base, with 5–9 pairs of coarse triangular teeth, grayish green above and scurfy pubescent at first, finally nearly glabrous, grayish tomentulose beneath; petioles 5–10 mm. long: frs. 2–3, on stalks 6–25 mm. long; acorn about 2 cm. long; cup hemispheric or turbinate, tomentose. H.I.6:562. Spain, Portugal. Intr. 1824 or 1835. Zone VII?

Closely related species are: **Q. infectoria** Olivier. Half-evergreen tree: differing chiefly in its glabrous or nearly glabrous lvs. and brts.; petioles slender, to 2.5 cm. long. Olivier, Voy. 1;t.14.15. (*Q. lusitanica* ssp. *orientalis* A. DC.) W. Asia, Cyprus. Intr. 1850. Zone VIII?—**Q. fruticôsa** Brotero. Half-evergreen shrub to 1, rarely to 4 m., sometimes partly prostrate: lvs. subsessile, elliptic, 3–5.5 cm. long, rounded or subcordate at base, margin undulate, with 4–7 pairs of triangular mucronate teeth, tomentulose beneath; petioles 2–4 mm. long. G.C.II.1:113. S.H.1:f.108w. (*Q. humilis* Lam., not Mill.) S. W. Eu., N. Afr. Intr. about 1829. Zone VII?—**Q. Vêneris** A. Kern. Deciduous tree; brts. pubescent: lvs. elliptic-oblong, 3–8 cm. long, obtuse or acute, usually broadly cuneate at base, with 5–9 pairs of shallow teeth, tomentulose beneath or glabrescent; petioles 1–1.5 cm. long; acorn usually inclosed ½ by the cup. S.H.1:191. Cyprus. Intr. 1862. Zone VII?

Sect. 9. Robur Reichenb. Styles short, dilated toward the apex and rounded; scales of the cup appressed: lvs. deciduous, usually dark green, deeply lobed, rarely dentate; frs. ripening the first year: bark of trunk dark, deeply furrowed.

34. **Q. póntica** K. Koch. Shrub or small tree; young brts. glabrous, ribbed; terminal bud large, conspicuous: lvs. elliptic to obovate-oblong, 10–15 cm. long, acute, broad-cuneate at base, sharply and irregularly serrate, with 13–17 strong veins, bright green above with yellow midrib, glaucescent beneath and hairy on the veins; petioles 6–15 mm. long, yellow: fr. subsessile; acorn ovoid, inclosed about ½ by the cup; scales ovate-lanceolate. Gt.40:510. S.L.309(h),310. Armenia, Cauc. Intr. 1885. Zone V.—Shrubby Oak with strikingly handsome and distinct rather large lvs.

35. **Q. Mirbéckii** Durieu. Tree to 30 m. or more; brts. glabrous or nearly so: lvs. ovate-oblong to obovate, 5–12 cm. long, acute, subcordate at base, coarsely dentate, with 6–13 pairs of obtusish teeth and with 8–14 pairs of veins, lustrous above, at first floccose-tomentose beneath, soon glabrous; petioles 1–2 cm. long: frs. 1–3 on a peduncle 5–10 mm. long; acorn inclosed about ½ by the hemispheric cup. S.H.1:f.108i,109i. G.M.56:139. E.H.5:t. 323, 332(h). (*Q. lusitanica* var. *M.* Guerke.) Spain, N. Afr. Intr. 1844 or 1845. Zone VII?—Ornamental tree.

36. **Q. macránthera** Fisch. & Mey. Tree to 20 m.; brts. tomentose: lvs. obovate, 6–18 cm. long and to 11 cm. broad, rounded at apex, narrowed toward the base, with 8–10 ovate lobes on each side, the middle lobes the largest, dark green and nearly glabrous above, grayish tomentose beneath; petioles 1–1.5 cm. long, pubescent: frs. 1–4, sessile; acorn about 2 cm. long, inclosed about ½ by the cup; scales lanceolate, the lower ones very loose. S.H.1:f.108v. Mus. Cauc.2,t.4(h). Cauc. and Armenia to n. Persia. Intr. before 1873. Zone V.—Ornamental tree with handsome large foliage.

37. **Q. conférta** Kit. Tree to 40 m.; brts. hairy at first, becoming glabrous;

lvs. very short-petioled, obovate to oblong-obovate, 10–18 cm. long, narrowed toward the auriculate base, deeply lobed or pinnatifid more than halfway to the middle, with narrow sinuses and usually 7 mostly dentate lobes sometimes 3-lobed at their apex, dark green and glabrescent above, grayish green and pubescent beneath; petioles 2–5 mm. long: frs. 2–5, short-stalked; acorn ovoid-oblong, about 2.5 cm. high, inclosed ⅓ to ½ by the cup-shaped cup; scales rather large and loosely appressed. H.W.2:73(b,h),t.24(c). R.I.12:t. 646(c). G.C.II.5:85. E.H.5:t.331(h). J.L.45:169(h). (*Q. hungarica* Hubeny, *Q. pannonica* Hort.) Balkan Pen., s. Italy. Cult. 1838. Zone V.—Ornamental tree with gradually spreading brs. forming a round-topped open head, and with dark green handsome foliage.

38. **Q. tŏza** Bosc. Tree to 15, rarely to 20 m., suckering; brts. slender, yellowish tomentose; buds pubescent: lvs. obovate to obovate-oblong, 6–14 cm. long, rounded and auriculate at base, deeply pinnatifid halfway or more to the midrib, with usually 5–6 pairs of rather narrow and acute lobes with few coarse teeth or entire, pubescent above, becoming finally glabrate, yellowish tomentose beneath; petioles 5–20 mm. long: frs. 1–5, subsessile or on a stalk to 2 cm. long; acorn oblong-ovoid, inclosed ⅓ to ½ by the cup-shaped cup with rather loosely appressed tomentose scales. Kotschy, Eich.t.22(c). S.H.1:f.108k,f.109l–l″. E.H.5:t.330(h). (*Q. tauzin* Pers., *Q. pyrenaica* Willd., *Q. camata* Hort., *Q. crinita* Hort., not Lam.) S. Eu. Intr. 1822. Zone VI?—Var. **péndula** Dipp. With pendulous branches and narrower leaves. (*Q. camata pendula* Hort.)—Tree with slender brs.

39. **Q. lanuginŏsa** Thuill. Pubescent O. Shrub or small tree to 15, rarely to 20 m.; brts. pubescent: lvs. obovate to oblong-obovate, 5–10 cm. long, broad-cuneate to subcordate at base, pinnately lobed with 4–8 pairs of usually shallow rounded lobes with undulate sinuses or pinnatifid sometimes halfway or more to the midrib and with acutish lobes, usually glabrous above, grayish green and pubescent or tomentose beneath; petioles 5–10 mm. long: frs. 1–4, sessile or short-stalked; acorn ovoid, 1.5–2 cm. high, inclosed ⅓ to ½ by the tomentose cup with closely appressed scales. H.W.2:69,71(b,h),t.23(c). Kotschy, Eich.t.34(c). J.L.45:184(h). (*Q. pubescens* Willd. 1805, not 1796, *Q. sessiliflora* var. *pubescens* Loud., *Q. robur* var. *l.* Lam.) S. Eu., Cauc., W. Asia. Long cult. Zone V or VI.—Exceedingly variable; besides the typical form which has medium-sized or rather small lvs. densely pubescent beneath with short, obtuse nearly entire or slightly toothed lobes (S.H.1:f. 122c), the following forms are sometimes cultivated: Var. **pinnatifída** Schneid. Lvs. 3–6 cm. long, deeply lobed with obtuse often coarsely dentate lobes, tomentose beneath, silky on the veins. S.H.1:f.122a. (*Q. pubescens* var. *p.* Spenner.)—Var. **crispâta** Beck. Lvs. 2–3 cm. long, deeply lobed with acute dentate and crisped lobes, tomentose beneath.—Var. **Tenŏrei** Rehd. Lvs. 7–14 cm. long, deeply sinuately lobed with about 5 pairs of narrow acute lobes. Kotschy, Eich.t.18(c, as *Q. vulcanica*). (*Q. Dalechampii* Ten., *Q. robur* ssp. *sessiliflora* var. *T.* A. DC.) Italy to W. Asia.—Var. **péndula** Nichols. With pendulous brs. and deeply lobed lvs. similar to those of the preceding var. (*Q. Aegilops p.* Hort., *Q. pseudaegilops p.* Kirchn.)

40. **Q. sessiliflŏra** Salisb. Durmast O. Large tree, but usually smaller than *Q. robur;* brts. glabrous or slightly pubescent at first: lvs. obovate to obovate-oblong, 8–12 cm. long, cuneate to subcordate at base, with 5–9 pairs of rounded lobes, lustrous and bright green above, grayish green and glabrous or slightly pubescent with branched hairs beneath; petioles 1–2 cm. long, yellow like the midrib, glabrous: frs. nearly sessile or short-stalked;

acorn ovoid to ovoid-oblong, inclosed about ⅓ by the hemispheric cup with closely appressed tomentose scales. H.W.2:66(h),67(b),t.22. M.S.1:t.2(c). L.A.3:1744,1745(h). E.H.2:t.92(h). (*Q. sessilis* Ehrh., *Q. robur* Mill., not L., *Q. robur* var. *s.* A. DC.) Eu., W. Asia. Long cult. Zone IV.—A variable species of which the following forms are sometimes cultivated: Var. **purpúrea** Jaeg. Young lvs. purple, changing to dark green with red veins. Var. *rubicunda* Henry.)—Var. **mespilifòlia** Koehne. Lvs. narrow acute at ends, entire or nearly so. H.W.2:65. (Var. *Louettei* Kirchn., *Q. robur* var. *m.* Wallr.)—Var. **insecâta** Rehd. Lvs. incisely lobed with narrow irregular lobes pointing forward. Gt.1912:495. M.D.1813:137,f.18. (Var. *laciniata* Koehne, not Duchartre, *Q. robur* var. *l.* Lam.)—Not so much planted as the following species; it keeps its lvs. longer and succeeds in drier situations.

Q. s. × *robur* = **Q. rosâcea** Bechst. Very variable: lvs. usually auricled at base. Jour. Bot. 48:t.502. M.D.1924:t.3. (*Q. hybrida* Bechst., not Brot., *Q. intermedia* Boenn.) With the parents in Eu. and cult.—*Q. s.* × *Ilex* = *Q. andlayensis;* see under No. 30.

41. **Q.ròbur** L. English O. Tree to 25, occasionally to 50 m.; trunk thick, with dark deeply furrowed bark; brts. glabrous: lvs. obovate to obovate-oblong, 5–12 cm. long, subcordate or truncate at base, with 3–7 pairs of rounded lobes, glabrous, dark green above, pale bluish green beneath; petioles 4–8 mm. long: frs. 1–5 on a peduncle 3–8 cm. long; acorn ovoid to ovoid-oblong, 1.5–2.5 cm. long, inclosed about ⅓ by the cup-shaped cup. H.W.2:54(h), 55(b),t.21(c). M.S.1:t.2(c). Em.134,t(h). L.A.3:1742(h). E.H.2:t.81–91, 93–96(h). (*Q. pedunculata* Ehrh., *Q. robur* ssp. *pedunculata* A. DC., *Q. femina* Mill.) Eu., N. Afr., W. Asia. Long. cult. Zone IV.—Very variable and in European nurseries more than 40 forms are grown, of which the following are those most often planted: Var. **variegàta** West. Lvs. variegated with white.—Var. **purpuráscens** K. Koch. Leaves purple while young, becoming finally nearly green. Nederl. Fl. Pomon. t.42(c). Deutsch. Mag. Gart. Blumenk.1875,23,t(c). (f. *sanguinea* Schneid., *Q. pedunculata* var. *p.* Loud.)—Var. **atropurpúrea** Hartw. & Ruempl. Lvs. dark purple or violet-purple. F.S.17:t.1783–84(c). Deutsch. Mag. Gart. Blumenk.1875: 23,t(c). (Var. *nigra* Van Houtte, not var. *nigra* Lam.)—Var. **concórdia** K. Koch. Lvs. bright yellow, particularly while young; habit upright. I.H. 14:t.537(c). F.E.13:t.19(h). (*Q. ped.* var. *c.* Kirchn.) Orig. 1843.—Var. **holophýlla** Rehd. Lvs. elliptic to oblong, 3–8 cm. long, obtuse, auricled at base, entire; petiole about 1 cm. long; fr. slender-stalked (*Q. ped.* var. *longifolia* Bean, not Kirchn.)—Var. **heterophýlla** K. Koch. Lvs. elongated, cuneate at base, with few irregular usually obtusish lobes pointing forward, occasionally curved and bullate, sometimes nearly entire. L.A.3:1733,1734. S.H.1:f. 126a-b. (f. *laciniata* Schneid., *Q. ped.* var. *h.* Loud., *Q. Fennessei* Hort.)—Var. **aspleniifòlia** Hartw. & Ruempl. Lvs. pinnatifid, cuneate at base, with triangular-lanceolate or lanceolate lobes gradually attenuated into setose points, occasionally obovate and merely dentate or linear and nearly entire. S.H.1:f.126f(extreme forms). (f. *diversifolia* Schneid., *Q. ped.* var. *a.* Kirchn.) —Var. **filicifòlia** Kuntze. Lvs. cuneate, irregularly and deeply pinnatifid with narrow nearly linear lobes with crisped margins and directed forward. G.C.II.14:632. S.H.1:f.126e. (*Q. ped.* var. *f.* Kirchn.)—Var. **pectinàta** K. Koch. Similar to the preceding, but the lvs. regularly pinnatifid with somewhat broader lobes. Nederl. Fl. Pom.t.42,f.3(c). S.H.1:f.126d. (*Q. ped.* var. *p.* Kirchn.)—Var. **péndula** K. Koch. Brs. pendulous. L.A.3:1733(h). J.L.45:203(h). (*Q. ped.* var. *p.* Loud. *Q. ped.* var. *Dauvessei* Hort.)—Var.

fastigiàta Kuntze. Brs. upright, forming a columnar head, like that of the Lombardy Poplar. G.C.III.41:149(h). J.L.45:203(h). Gt.65:86(h). F.E. 13:416,t.3(h, as *Q. Lucombeana*). (*Q. pyramidalis* Gmel., *Q. f.* Lam., *Q. ped.* var. *f.* Loud.) Several closely related forms of similar habit but with variations in the foliage are occasionally cult.—Stately tree with short and thick trunk and widespreading stout limbs forming an open broad head, and with the lvs. remaining green until late in autumn.

Q. r. × *Ilex*? = **Q. Túrneri** Willd. Half-evergreen tree to 15 m.; brts. stellate-pubescent: lvs. obovate and elliptic, 6–8 cm. long, acute or obtuse, rounded and sometimes slightly auricled at base, remotely sinuately toothed with 5–6 broad, acute and mucronate teeth, dark green and finally glabrous above, glabrous except stellate-pubescent on the veins beneath; petiole 4–8 mm. long, pubescent: frs. 3–7 on a slender tomentose peduncle; acorn ovoid, about 2 cm. long; cup hemispheric, tomentose. Willdenow, Berl. Baumz. t.3,f.2. J.L.45:217(h). Orig. in England before 1785.—Var. **pseudotúrneri** Henry. Lvs. longer and narrower, obovate-oblong to oblong, 7–10 cm. long and 4–5 cm. broad, teeth usually longer and narrower, less pubescent beneath. S.H.1:f.126g-h. G.C.II.14:714 (as *Q. glandulifera*). G.W.5:259(h). (*Q. pseudoturneri* Schneid. *Q. aizoon* Koehne, *Q. austriaca sempervirens* Hort.)—This var. is better known in cult. than the type; it is a shrubby tree with handsome dark green lvs. retained in milder climates until spring. Zone VI.—*Q. r.* × *sessiliflora* = *Q. rosacea;* see under No. 40.—*Q. r.* × *montana* = *Q. Sargentii;* see under No. 52.

A closely related species is *Q.* **haas** Kotschy. It differs chiefly in the finely pubescent brts., in the larger lvs. stellate-pubescent beneath and in the larger acorns. Kotschy, Eich.,t.2(c). Asia Minor. Intr. before 1870? Zone V or VI.

Sect. 10. Prinus Loud. Styles short, broad at apex: lvs. deciduous, dentate or lobed: cup with appressed scales, rarely the upper free and subulate: bark usually thin, gray and scaly.

42. **Q. alba** L. White O. Tree to 30 m.; brts. soon glabrous, becoming light reddish brown, often glaucous: lvs. obovate to oblong-obovate, 10–22 cm. long, narrowed at base, with 5–9 oblong and obtuse, usually entire lobes, pubescent when unfolding, soon glabrous, bright green above, glaucescent beneath; petioles 1.5–2.5 cm. long: frs. short- or long-stalked; acorn ovoid-oblong, 2–2.5 cm. high, inclosed about ¼ by the cup-shaped cup with the basal scales much thickened. M.S.1:t.1(c). S.S.8:t.356, 357, 358. S.M.301. G.F.3:91;4:6,7;5:259(h). B.T.333(h). Me. to Fla., w. to Minn. and Tex. Intr. 1724. Zone IV.—Var. **latíloba** Sarg. Lvs. divided usually less than halfway to the midrib into broad rounded lobes. S.M.302.—Var. **repánda** Michx. Lvs. with rather shallow sinuses and the frs. usually short-stalked.—The typical form (var. *pinnatifida* Michx.) has the lvs. deeply pinnatifid, with narrow often toothed lobes and usually slender-stalked frs.—This is one of the noblest trees of the northern states, with stout spreading brs. forming a broad open head and bright green foliage turning deep vinous-red or violet-purple in autumn.

Q. a. × *stellata* = *Q. Fernowii;* see under No. 47.—*Q. a.* × *macrocarpa* = *Q. Bebbiana;* see under No. 49.—*Q. a.* × *bicolor* = *Q. Jackiana;* see under No. 50.—*Q. a.* × *montana* = *Q. Saulii;* see under No. 52.—*Q. a.* × *Muhlenbergii* = *Q. Deamii;* see under No. 54.

43. **Q. lobàta** Née. Valley O. Tree to 30 m.; brts. grayish, short-pubescent, glabrous the second year: lvs. obovate, 6–8 cm. long, cuneate to subcordate at base, with 7–11 ovate obtuse, sometimes dentate lobes, dark green and stellate-pubescent above, grayish tomentulose beneath; petioles about 1 cm. long, pubescent: frs. nearly sessile; acorn narrowly conic-oblong, 3.5–5 cm. long, inclosed ¼ to ⅓ by the cup-shaped cup; upper scales with acuminate free tips, the lower ones much thickened. S.S.8:t.362. J.S.t.61, 63–64(h),62(b). G.F.3:611;10:55, 202, 205(h). (*Q. Hindsii* Benth.) Calif.

Intr. 1874. Zone VIII.—Handsome tree with widespreading brs. forming a round or oblong head with drooping brts.; scarcely planted outside of Calif.

44. **Q. Garryàna** Dougl. OREGON O. Tree to 30 m., shrubby at high altitudes; brts. tomentose or pubescent, orange-colored, glabrous the second year: lvs. oblong-obovate, 8–14 cm. long, cuneate or rounded at base, with 3–5 pairs of broad-ovate, obtuse, entire or toothed lobes and with rounded sinuses reaching about halfway to the midrib, dark green and glabrous above, bright green and pubescent or glabrate beneath: petioles pubescent, 1.5–2.5 cm. long: frs. sessile or short-stalked, acorn ovoid, 2.5–3 cm. long, inclosed about ⅓ by the rather shallow cup-shaped cup pubescent or tomentose outside; scales with thin pointed free tips, sometimes thickened. N.S.1:t.1(c). S.S.8:t.364, 365. G.F.7:495(h). F.E.32:919(h). B. C. to Calif. Intr. 1909. Zone VIII?—Handsome tree with spreading or ascending brs. forming a broad compact head.

A related species is **Q. undulàta** Torr. Small tree to 10 m.; brts. tomentose: lvs. elliptic-oblong, 3–7 cm. long, coarsely sinuate-dentate or lobed, the lobes often spinescent, bluish green, stellate-hairy above, pubescent below, firm: acorn ovoid, 2–2.5 cm. long. Colo. to Nev., n. Mex. and w. Tex. N.S.2:t.3(c). S.S.8: t.385. Intr. 1917. Zone V.

45. **Q. utahénsis** Rydb. Tree to 15 m.; brts. densely yellowish pubescent, sometimes nearly glabrous in autumn, light brown: lvs. oblong to oblong-obovate, 6–12 cm. long, pinnatifid halfway to or nearly to the midrib, with 3–5 pairs of ovate or ovate-lanceolate, acutish or obtuse lobes usually entire or the middle ones with 1 or 2 teeth, the sinuses rather narrow, dark green and lustrous, sparingly stellate, at maturity glabrate or sometimes rough above, light green and soft-pubescent beneath and reticulate; petioles pubescent, 5–10 mm., rarely to 15 mm. long: frs. 1–2, subsessile; acorn ellipsoid or ellipsoid-oblong, 1.5–2 cm. high, inclosed about ⅓ by the cup-shaped cup 1.2–2 cm. wide with ovate pubescent much thickened scales. S.M.297. B.T.339. (*Q. submollis* Rydb.) Colo. to Utah, N. Mex. and w. Tex. Intr. 1916. Zone VI?—Small tree with dark green handsome foliage.

46. **Q. novo-mexicàna** Rydb. Tree to 10 m. or shrubby; brts. finely pubescent or glabrous, light brown: lvs. obovate to oblong-obovate, 6–10 cm. long, pinnatifid halfway to or nearly to the midrib, similar to those of the preceding species, usually somewhat smaller, glabrous above, puberulous or nearly glabrous below, with whitish, conspicuous veins: acorns 1–1.5 cm. high, obtuse, broad-ovoid to ellipsoid, inclosed ⅓ or ½ by the cup; scales ovate, slightly thickened and slightly pubescent. Bull. N. Y. Bot. Gard. 2:t.27. Mem. Nat. Acad. Sci. 20:t.164, 165. (*Q. nitescens* Rydb.) Colo. to Utah and N. Mex. Intr. 1916. Zone VI?

Closely related to this are the following species: **Q. Gunnisònii** Rydb. Lvs. mostly oblong, lobed halfway to the middle or less, rather dull above. Bull. N. Y. Bot. Gard. 2:t.26,f.3. Colo. to N. Mex. and Utah. Intr. 1916. Zone V.—**Q. Gambélii** Nutt. Lvs. lobed about halfway to the middle, less lustrous: acorns acute, inclosed about ½ by the cup. S.S.8:t.366–7. Colo. to Utah and N. Mex. Intr. 1894. Zone V.—**Q. leptophýlla** Rydb. Tree to 15 m.: lvs. broad-obovate, 10–15 cm. long, with 2–4 pairs of obtuse lobes, the sinuses reaching about halfway or less to the midrib, glabrous beneath except on the veins: acorn about 1.5 cm. high, inclosed about ½ by the cup; scales slightly thickened. B.T.340. S.M.299. Colo. Intr. 1911. Zone V.

47. **Q. stellàta** Wangh. POST O. Tree to 20, rarely to 30 m.; bark reddish brown, deeply fissured and scaly: brts. tomentose: lvs. obovate, lyrate-pinnatifid, 10–20 cm. long, usually cuneate at base, rarely rounded, with 2–3 pairs of broad obtuse lobes, the middle pair much larger and mostly with a lobe on the lower margin, separated from the lower lobes by wide,

from the upper by narrow sinuses dark green and rough above, with grayish or brownish, rarely white tomentum beneath; petioles 1–2 cm. long: frs. sessile; acorns ovoid, 1.5–2.5 cm. high, obtuse, inclosed ⅓ or ½ by the cup-shaped or turbinate cup; scales thin, acute, loosely appressed, hoary-tomentose. M.S.1:t.5(c). S.S.8:t.368, 369. H.H.166, 167(b). (*Q. obtusiloba* Michx., *Q. minor* Sarg.) S. Mass. to Fla., w. to Neb. and Tex. Intr. 1819. Zone V.—Tree with dense round head and large dark green lvs.

Q. s. × *alba* = **Q. Fernòwii** Trel. Lvs. narrower and more regularly lobed, tomentulose beneath: fr. usually short-stalked. S.S.8:t.359. With the parents. Intr. before 1898.

48. **Q. lyràta** Walt. Overcup O. Tree to 30 m.; brts. pubescent, glabrescent during the first winter: lvs. obovate-oblong, 14–20 cm. long, cuneate at base, deeply lyrate-pinnatifid, with 3–4 pairs of obtuse or acutish lobes, the 2 lower pairs much smaller and usually triangular and separated from the upper pairs by wide sinuses, the large middle pair usually with a small lobe on the lower margin, the terminal lobe usually 3-lobed, dark green and glabrous above at maturity, white-tomentose beneath or green and pubescent: petioles glabrous or pubescent, 1–2 cm. long: frs. sessile or stalked; acorn subglobose or ovoid, 1.2–2.5 cm. high, usually nearly entirely or rarely only ½ inclosed by the cup; lower scales much thickened, the upper thinner, acute and forming a ragged edge. M.S.1:t.6. S.S.8:t.374. H.H.170, 171(b). Bull. Torr. Bot. Club 49:t.16,17(h). (Swamp or Swamp Post Oak.) N. J. to Fla., w. to Mo. and Tex. Intr. 1786. Zone V.—Handsome round-headed tree with short, often pendulous, brs. and large lvs.

49. **Q. macrocârpa** Michx. Burr O. Tree to 25 or occasionally to 55 m. tall; bark light brown, deeply furrowed and scaly; brts. stout, densely pubescent, usually glabrescent during the first winter, sometimes developing corky wings: lvs. obovate to oblong-obovate, 10–24 cm. long, cuneate or rarely rounded at base, lyrate-pinnatifid, the lower portion of the leaf usually with 2–3 pairs of lobes separated by wide and deep sinuses from the terminal lobe usually very large and with 5–7 pairs of ovate-obtuse lobes or smaller and 3-lobed, dark green and usually lustrous above, grayish or whitish tomentulose beneath: frs. sessile or short-stalked; acorn broadly ovoid or ellipsoid, 2–3.5 cm. high, inclosed usually ½ or sometimes less or more by the large cup, its upper scales ending into slender awns and forming a fringe-like border, the lower ones much thickened. M.S.1:t.3(c). S.S.8:t.371, 372. H.H.168, 169(b). G.F.2:500(b);3:407(h). (Mossy Cup Oak.) N. S. to Pa., w. to Man. and Tex. Intr. 1811. Zone I.—Var. **olivaefórmis** Gray. Lvs. smaller, more deeply divided, often nearly to the midrib, the lobes almost all narrow: acorn smaller, ellipsoid-oblong, enclosed more than ½ by the turbinate cup higher than broad. M.S.1:t.2(c). S.S.8:373. M.G.16:67(h).—Handsome tree, usually with a tall trunk and spreading brs. forming a broad head; pyramidal while young; the often corky brs. conspicuous in winter. One of the hardiest of all Oaks.

Q. m. × *alba* = **Q. Bebbiàna** Schneid. Lvs. with usually 5 pairs of less unequal lobes, pubescent beneath: cup scarcely fringed. S.S.8:t.560. With the parents. Intr. 1880.—*Q. m.* × *bicolor* = *Q. Schuettei;* see under No. 50.

50. **Q. bícolor** Willd. Swamp White O. Tree to 20, rarely to 30 m.; bark light grayish brown, scaly; brts. scurfy-pubescent at first: lvs. oblong-obovate to obovate, 10–16 cm. long, narrowed toward the base and acute or rounded, coarsely sinuate-dentate or sometimes lobed halfway to the midrib, with 6–10 pairs of entire usually obtuse teeth, dark green above, whitish tomentose or grayish green and velvety beneath; petioles 1–2 cm.

long: frs. 1–2 on slender peduncles 3–8 cm. long; acorn ovoid-oblong, 2–3 cm. high, inclosed about ⅓ by the cup. M.S.1:t.7(c). S.S.8:t.380, 381. H.H.172, 173(b). G.F.4:246(h). E.H.5:t.329(h). (*Q. platanoides* Sudw., *Q. Prinus* var. *tomentosa* Michx., *Q. Prinus* var. *discolor* Michx.) Que. to Ga., w. to Mich. and Ark. Intr. 1800. Zone III.—Tree with rather narrow round-topped open head; easily recognized by the light grayish scaly bark and the numerous brts. on the larger limbs; the lvs. turn yellow-brown or orange or red in autumn.

Q. b. × *alba* = **Q. Jackiàna** Schneid. Lvs. with rather short lobes, thinly tomentulose or pubescent beneath: fr. usually stalked. With the parents. Intr. 1916.—*Q. b.* × *macrocarpa* = **Q. Schuèttei** Trel. Brs. sometimes with corky wings: lvs. intermediate: cup sometimes short-fringed. Proc. Am. Philos. Soc. 56:t.2,3. With the parents. Intr. 1916.

51. **Q. Prìnus** L. Basket O. Tree to 30 m.; bark light gray, scaly; brts. hairy at first: lvs. obovate to obovate-oblong, 10–16 cm. long, acute or acuminate, cuneate or rounded at base, coarsely and regularly toothed, with 10–14 pairs of obtusish, often mucronate, teeth, bright green and lustrous above, grayish tomentulose beneath; petioles 1.5–3.5 cm. long: frs. short-stalked; acorn ovoid-oblong, 2.5–3.5 high, inclosed ⅓ to nearly ½ by the cup; lower scales much thickened and the tips of the upper ones often forming a stiff fringe. M.S.1:t.8(c). S.S.8:t.382, 383. H.H.174, 175(b). (*Q. Michauxii* Nutt., *Q. Prinus palustris* Michx.) Del. to Fla., w. to Ind., Mo. and Tex. Intr. 1800 or before? Zone V.—Handsome Oak with round-topped, rather compact head, the lvs. turning rich crimson in autumn. It prefers moist soil.

52. **Q. montàna** Willd. Chestnut O. Tree to 25 or 30 m.; bark dark brown, ridged; brts. pubescent at first or glabrous: lvs. oblong-obovate to lanceolate-oblong, 12–18 cm. long, acutish or acuminate, narrowed toward the acute or rounded base, coarsely crenate-dentate, with 10–15 obtuse teeth, lustrous and bright or yellowish green above, paler beneath and tomentulose when young, often nearly glabrous at maturity; petioles 1.5–3 cm. long, glabrous: frs. 1–2 on peduncles shorter than the petioles; acorn ovoid, 2.5–3.5 cm. high, inclosed ⅓–½ by the usually tuberculate cup. M.S.1:t.9(c). S.S.8:t.375, 376. H.H.176, 177(b). G.F.1:510(h). (*Q. Prinus* Engelm., not L., *Q. Prinus* var. *monticola* Michx.) Me. and Ont. to S. C. and Ala. Cult. 1730. Zone IV.—Handsome Oak with broad irregular head and handsome lustrous lvs. turning dull orange in autumn. It grows well in rather dry rocky soil.

Q. m. × *robur* = **Q. Sargèntii** Rehd., a tree of vigorous growth, chiefly distinguished from *Q. montana* by the auriculate base of the lvs. and the fewer lobes. Gs.4:26(h). Orig. before 1830.—*Q. m.* × *alba* = **Q. Saùlii** Schneid. Lvs. with 6–8 nearly equal lobes on each side. S.S.8:t.361. Intr. about 1883.

53. **Q. prinoìdes** Willd. Chinquapin O. Spreading shrub to 2 m., rarely slender tree to 5 m.; brts. soon glabrous: lvs. ovate-oblong to oblong, 6–12 cm. long, acute, cuneate at base, undulate-dentate, with 3–7 pairs of small acute or obtusish teeth, bright green and glabrous above, grayish tomentulose beneath; petioles 5–10 mm. long: frs. sessile; acorn ovoid, 1–1.5 cm. long, inclosed about ½ by the cup; scales tuberculate. M.S.1:t.11(c). S.S.8:t.378. Em.1:158,t. (*Q. Chinquapin* Pursh.) Me. to Ala., w. to Minn. and Tex. Intr. 1823. Zone V or IV?

54. **Q. Muhlenbérgii** Engelm. Yellow Chestnut O. Tree to 20 or occasionally to 50 m. tall; brts. hairy at first soon glabrous: lvs. oblong to oblong-lanceolate, 10–16 cm. long, acute or acuminate, usually rounded at base, coarsely toothed, with about 8–13 pairs of acute and mucronate, often

incurved teeth, dark or yellowish green above, whitish tomentulose beneath; petioles 2–3.5 cm. long: fr. subsessile; acorns globose-ovoid to ovoid, 1.5–2 cm. long, inclosed about ½ by the thin cup; scales small, appressed. M.S.1:t.10. S.S.8:t.377. H.H.178,179(b). (*Q. acuminata* Houba, not Roxb., *Q. Castanea* Willd., not Née.) Vt. to Va., w. to Neb., N. Mex. and Tex. Intr. 1822. Zone V.

Q. M. × *alba* = **Q. Deàmii** Trel. Lvs. rather deeply lobed, with 7–9 pairs of rather acutish lobes, tomentulose beneath: fr. short-stalked. With the parents. Intr. 1916.

55. **Q. alièna** Bl. Tree to 20 m. tall or more; brts. glabrous: lvs. oblong-obovate, 10–20 cm. long, obtuse or acutish, cuneate at base, coarsely sinuate-dentate, with 10–15 pairs of usually obtuse teeth, dark yellowish green and glabrous above, whitish or grayish tomentulose beneath; petioles 1–2.5 cm. long, glabrous: frs. 1–3, short-stalked or subsessile; acorn ovoid to ovoid-oblong, 2–2.5 cm. long, inclosed about ⅓ by the grayish tomentulose cup; scales thin, acuminate. S.I.1:t.28(c). C.C.98. N.K.3:t.14. Japan, Korea to C. China. Intr. 1905. Zone V.—Var. **acuteserràta** Maxim. Lvs. usually somewhat smaller and narrower and teeth acutish and usually incurved at the gland-tipped apex. Japan, C. China.—Ornamental tree with handsome foliage resembling that of the Chestnut Oak.

A closely related species is **Q. Fabri** Hance. Tree is 25 m. tall; brts. pubescent and furrowed; lvs. with 6–10 pairs of short rounded lobes, grayish tomentulose and reticulate beneath: acorn cylindric-oblong, 2 cm. long. C.C.96. China. Intr. 1908. Zone VI?

56. **Q. glandulífera** Bl. Tree to 15 m. or occasionally taller; brts. silky-pubescent when young; lvs. oblong-obovate to ovate-lanceolate, 6–15 cm. long, acute, cuneate or rarely rounded at base, with 7–12 pairs of acute gland-tipped teeth, bright green and lustrous above, grayish beneath and appressed silky-pubescent; petioles 6–15 mm. long: frs. 1 or several on a short stalk; acorn ovoid, 1–1.5 cm. high, inclosed about ⅓ by the cup. S.I. 1:t.26(c). N.K.3:t.13. D.L.2:88. Japan, Korea to W. China. Cult. 1877. Zone V.—Handsome small tree with lustrous bright green foliage remaining green until late in autumn.

57. **Q. mongòlica** Fisch. Mongolian O. Tree to 30 m. tall; brts. glabrous: lvs. very short-stalked and crowded at the ends of the brts., obovate to obovate-oblong, 10–20 cm. long, obtuse, narrowed toward the auricled base, coarsely sinuate-dentate with 7–10 broad usually obtuse teeth, dark green above, paler beneath and pilose on the nerves or nearly glabrous; petioles 4–8 mm. long: frs. short-stalked or subsessile; acorn ovoid or ellipsoid, about 2 cm. long, inclosed about ⅓ by the thick cup; scales tuberculate, the uppermost thinner and acuminate forming a short fringe. D.H.2:82. N.K.3:t.11. E. Siber., N. China, Korea, N. Japan. Intr. 1879. Zone (II?), V.—Var. **grosseserràta** Rehd. & Wils. Lvs. somewhat smaller, usually acutish, with acute or acutish sometimes denticulate teeth: cup with closely appressed scales not fringed. S.I.1:t.27(c). (*Q. crispula* Bl., *Q. g.* Bl.) Japan, Saghal. Intr. 1893. Zone V.—Ornamental tree of vigorous growth with handsome large foliage; easily recognized by its very short-stalked nearly glabrous lvs. clustered at the end of the brts. The variety is better known in cult. than the type.

Sect. 11. Dentatae Schneid. Style short, broad and rounded at apex; fr. annual; scales of cup linear-lanceolate, free, spreading: lvs. deciduous, dentate; bark of trunk dark, deeply fissured.

58. **Q. dentàta** Thunb. Tree to 25 m.; brts. stout, grayish pubescent: lvs. short-stalked, obovate, 10–20 or sometimes over 30 cm. long and up to

20 cm. wide, obtuse, narrowed toward the auriculate or rarely cuneate base, sinuate-dentate, with 4–9 pairs of broad rounded lobes, dark green above and at first short-pubescent, later glabrous, beneath grayish tomentose at first, later light green and soft-pubescent; petioles 2–5 mm. long: frs. usually clustered and subsessile; acorn globose-ovoid, 1.5–2 cm. high, inclosed about ½ or more by the large cup covered with lanceolate spreading scales. S.I. 1:t.27(c). N.K.3:t.20. G.F.6:386(h). F.E.14:542,t.29(h). (*Q. obovata* Bge., *Q. Daimio* Hort.) Japan, Korea, N. and W. China. Intr. 1830. Zone V.—Var. **pinnatífida** Matsum. Lvs. divided almost to the midrib into linear lobes with crisped margins. Cult. 1880.—A round-headed tree with very large lvs.

15. ULMACEAE Mirb. ELM FAMILY.

Trees, rarely shrubs with watery juice; buds with imbricate scales: lvs. 2-ranked, alternate, usually oblique at base, pinnately veined, serrate or rarely entire; stipules deciduous: fls. perfect or monoecious; perianth 4–5-rarely 3- or 6–8-merous, usually more or less connate; stamens as many or rarely twice as many as perianth-lobes; filaments straight; ovary superior, 1-celled, with 1 suspended ovule; style 2-parted: fr. a samara, nutlet or drupe; seed usually without endosperm, with straight or curved embryo; cotyledons flat.—About 15 genera with more than 150 species, distributed through both hemispheres except the polar regions.

A. Lvs. with 7 or more pairs of parallel veins, the lowest pair not prominent: winter-buds spreading: perianth more or less connate.
  B. Fls. perfect, before the lvs. or in autumn; fr. winged: lvs. usually doubly serrate. 1. *Ulmus*
BB. Fls. at least partly unisexual, the pistillate ones axillary on the young brts.; stamens 4–5: lvs. simply serrate.
  C. Fr. muricate, symmetrical; style centric. 2. *Planera*
  CC. Fr. not muricate, oblique; style excentric.
    D. Fr. obliquely winged: brts. partly rigid and thorny, particularly on young plants. 3. *Hemiptelea*
    DD. Fr. oblique, not winged: brts. always slender, never spiny. 4. *Zelkova*
AA. Lvs. 3-nerved at base; pairs of veins usually less than 6; winter-buds appressed: parts of perianth free: fls. unisexual.
  B. Fr. a small winged nutlet; anthers hairy at apex: veins of lvs. curving before the margin: brts. glabrous, chestnut-brown. 5. *Pterocelti*s
BB. Fr. a drupe: anthers glabrous: brts. usually grayish brown and pubescent.
  C. Veins curving before the margin: cotyledons broad. 6. *Celtis*
  CC. Veins straight, ending in the teeth: cotyledons narrow. 7. *Aphananthe*

1. ULMUS L. Elm. Deciduous, rarely half-evergreen trees: buds conspicuous: lvs. short-petioled, usually oblique at base, usually doubly serrate: fls. perfect, appearing in spring before the lvs. or in autumn in the axils of the lvs., in fascicles or racemes; calyx campanulate, 4–9-lobed with an equal number of stamens: fr. a compressed nutlet surrounded by a broad rarely narrow membranous wing. Frs. ripening a few weeks after flowering. (The ancient Latin name of the tree.) About 18 species in the temp. regions of the n. hemisphere; in Am. s. to n. Mexico, but absent w. of the Rocky Mts., in Asia s. to the Himal.—Ornamental trees much planted as street or shade trees; of rapid growth and easily transplanted.

A. Fls. appearing in spring before the lvs.: calyx-lobes short.
  B. Fls. on slender pedicels, drooping: frs. ciliate.
    C. Fr. glabrous except the ciliate margin: lvs. ciliate: brs. not corky: fls. fascicled.
      D. Lvs. widest above the middle, densely pubescent beneath: buds elongated, pointed. 1. *U. laevis*
      DD. Leaves widest about the middle, often nearly glabrous beneath: buds ovoid, obtusish or acute. 2. *U. americana*
    CC. Fr. pubescent: brs. usually more or less corky: fls. racemose.
      D. Lvs. not ciliate, 5–10 cm. long: buds pubescent. 3. *U. racemosa*
      DD. Leaves minutely ciliate, 3–6 cm. long: buds glabrous. 4. *U. alata*
BB. Fls. short-pedicelled, not pendulous, in dense clusters.
  C. Buds covered with rusty hairs, obtuse: brts. scabrous: lvs. ciliate: fr. pubescent in the middle. 5. *U. fulva*

cc. Buds pale-pubescent or glabrous; brts. smooth, glabrous or pubescent: lvs. not ciliate; fr. glabrous.
d. Lvs. doubly serrate, unequal at base, 5–20 cm. long.
e. Young brts. pubescent: lvs. scabrous above.
f. Fr. with the seed in the centre, about 2 cm. broad: petioles about 3 mm. long.
g. Mature brts. reddish brown, hairy while young: lvs. rarely 3-lobed at apex. 6. *U. glabra*
gg. Mature brts. pale yellowish or grayish brown, glabrous or nearly so while young: lvs. mostly 3-lobed at apex. 7. *U. laciniata*
ff. Fr. with the seed near the apex, 1.5 cm. broad or less; petioles 4–8 mm. long.
g. Lvs. broad-elliptic or ovate, 5–7 cm. long: brts. not corky. 8. *U. procera*
gg. Lvs. obovate or elliptic, 7–10 cm. long: brts. often with corky wings. 9. *U. japonica*
ee. Young brts. glabrous or with few scattered hairs: fr. with the seed above the middle.
f. Lvs. 7–15 cm. long; petioles 6–8 mm. long. 10. *U. hollandica*
ff. Lvs. 3.5–8 cm. long.
g. Petioles 6–12 mm. long; lvs. smooth above, 5–8 cm. long. 11. *U. foliacea*
gg. Petioles about 5 mm. long; lvs. slightly scabrous above, 3.5–6 cm. long. 12. *U. minor*
dd. Lvs. simply or nearly simply serrate, nearly equal at base, 2–5 cm. long. 13. *U. pumila*
aa. Fls. appearing in autumn in the axils of the lvs.; calyx divided beyond the middle.
b. Lvs. simply serrate, small: fr. glabrous. 14. *U. parvifolia*
bb. Lvs. doubly serrate, 5–8 cm. long: fr. pubescent. 15. *U. serotina*

Sect. 1. Blepharocarpus Dum. Fls. before the lvs. on elongated unequal pedicels, fascicled; calyx with 5–8 unequal short lobes: fr. ciliate.

1. **U. laèvis** Pall. European White E. Tree to 30 m.; bark brownish gray, smooth at first, later scaly and exfoliating, finally furrowed: brts. pubescent usually until the second year; buds elongated, acute: lvs. elliptic or obovate, 6–12 cm. long, acuminate, very unequal at base, sharply and doubly serrate, usually glabrous above, pubescent beneath; petioles 4–6 mm. long: fls. on pedicels 6–20 mm. long; stamens 6–8, exserted; stigma white: fr. ovate, 1–1.5 cm. long, notched, the incision not reaching the nutlet, ciliate. H.W.2:9(h),t.39(c). R.I.12,t.666(c). I.T.6:t.220. S.H.1:214(h). E.H.7,t. 389, 390(h). (*U. pedunculata* Foug., *U. effusa* Willd., *U. racemosa* Borkh.—Spreading E.) C. Eu. to W. Asia. Long cult. Zone IV.—Tall tree with spreading brs. forming a broad open head; rarely cult.; very similar to the following species.

2. **U. americàna** L. White E. Tree to 40 m.; bark light gray, scaly and deeply fissured; brts. pubescent while young or sometimes nearly glabrous; buds ovoid, obtusish or acute: lvs. ovate-oblong, 7–15 cm. long, acuminate, unequal at base, doubly serrate, glabrous and rough above, pubescent or nearly glabrous beneath; petioles 5–8 mm. long: fls. on pedicels 1–2 cm. long; stamens 7–8, exserted; stigmas white: fr. elliptic, about 1 cm. long, deeply notched at apex, the incision reaching to the nutlet, ciliate. M.S.3: 269,t(c). S.S.7:t.311. H.H.182, 183(b). G.F.3:443, 467(h);6:175(h). F.E.15: t.46(h). Dame & Brooks, Typ. Elms, 50tt.(h). (*U. alba* Raf.—American Elm, Water Elm.) Nfd. to Fla., w. to the foot of the Rocky Mts. Intr. 1752. Zone I.—Var. **columnàris** Rehd. Tree with upright brs. forming a rather wide columnar head usually broad at the top. Cult. 1921.—Var. **pendula** Ait. Tree with long pendulous brs.—Tall tree with the limbs usually gradually spreading outwards and forming a wide-spreading head with pendulous brts.; very variable in habit. A favorite avenue tree in the N. E. States.

Sect. 2. Chaetoptelea Schneid. Fls. before the lvs., on slender pedicels, racemose: fr. pubescent and ciliate; seed near apex.

3. **U. racemòsa** Thomas, not Borkh. Rock E. Tree to 30 m.; brts. pubescent, usually until the second year and developing later usually irregular corky wings; buds large, acute, pubescent: lvs. elliptic to oblong-obovate, 5–10 cm. long, short-acuminate, unequal at base, doubly serrate, glabrous

or somewhat rough above, pubescent beneath, without axillary tufts; petioles 2–6 mm. long: fls. in pendulous racemes to 5 cm. long; stamens 5–8, exserted; stigmas greenish white: fr. elliptic or obovate, 1.5–2 cm. long, with a small notch at apex, pubescent. S.S.7:t.312. H.H.184, 185(b). (*U. Thomasii* Sarg. —Cork E.) Que. to Tenn., w. to Neb. Intr. 1875. Zone II.—Tree with short spreading brs. forming an oblong, round-topped head; of slow growth and rarely planted; the lvs. turn bright yellow before falling.

4. **U. alàta** Michx. Wahoo E. Tree to 15 m.; brts. nearly glabrous, developing usually 2 broad opposite corky wings; buds acute, glabrous: lvs. ovate-oblong to oblong-lanceolate, 3–6 cm. long, acute or acuminate, doubly serrate, glabrous above, pubescent beneath, with axillary tufts, subcoriaceous; petioles 1–3 mm. long: racemes short, few-fld.; stamens usually 5: fr. ovate-elliptic, about 8 mm. long, narrow-winged, with 2 incurved beaks at apex, villous. M.S.3:275,t(c). S.S.7:t.313. H.H.186, 187(b). (Winged E.) Va. to Fla., w. to Ill. and Texas. Intr. 1820. Zone VII.—Small tree with spreading brs. forming a round-topped oblong head, with small lvs. turning dull yellow before falling. Sometimes planted as a street tree in the s. States.

Sect. 3. Madocarpus Dum. Fls. before the lvs. on short pedicels, fascicled; calyx with 4–7 equal short lobes: fr. rarely ciliate: lvs. deciduous.

5. **U. fulva** Michx. Slippery E. Tree to 20 m.; brts. pubescent and scabrous, red-brown or orange; buds large, fulvous-pubescent: lvs. obovate to oblong, 10–20 cm. long, long-acuminate, very unequal at base, doubly serrate, very rough above, densely pubescent beneath; petioles 4–8 mm. long: fls. short-stalked, in dense clusters; stamens 5–9; stigmas pinkish: fr suborbicular to broadly elliptic, 1–2 cm. long, slightly notched, rufous-pubescent in the centre. M.S.3:278,t.(c). S.S.7:t.314. H.H.188, 189(b). Am. For.19:143,t.(h); 22:278(b). (*U. rubra* Michx. f., *U. elliptica* Koehne, not Koch, *U. Heyderi* Spaeth, *U. sibirica* Hort., ? *U. pubescens* Walt.—Red E. Queb. to Fla., w. to Dak. and Texas. Intr. before 1830. Zone III.—Tree with spreading brs. forming usually a broad open head, with large handsome foliage turning dull yellow in autumn.

A related species is **U. macrocárpa** Hance. Small tree or shrubby; brts. pubescent at first, often with 2 corky wings; lvs. broad-obovate or elliptic, 3–7 cm. long, usually abruptly short-acuminate, rough above, slightly pubescent beneath: fr. obovate, 2–2.5 cm. long, pubescent and ciliate. S.H.2:f.566h. Nouv. Arch. Mus. Paris, II.7:t.8,f.c. China. Intr. 1908. Zone V.

6. **U. glabra** Huds. Wych E. Tree to 40 m., without suckers; bark remaining smooth for many years (hence its name "glabra"); brts. pubescent while young, without corky wings; buds obtuse, pubescent: lvs. very short-petioled, oblong-obovate to elliptic or obovate, 8–16 cm. long, abruptly acuminate, very unequal at base, sharply and doubly serrate, scabrous above, pubescent beneath, rarely nearly glabrous; petioles 3–6 mm. long: fls. in dense clusters; stamens 5–6, slightly exserted; stigmas red: fr. obovate or broadly elliptic, 2–2.5 cm. long, with a small notch at apex, glabrous; seed in the middle. H.W.2:7,8(h),t.38(c). R.I.12:t.665 (c, as *U. major*). E.H.7: t.394, 400(h). G.C.III.39:152,suppl.(h). (*U. scabra* Mill., *U. montana* With., *U. campestris* L. in part.) N. and C. Eu., W. Asia. Long cult. Zone IV.—There are many garden forms of which the following are the most often cult. Var. **purpúrea** Rehd. Lvs. purple when young. (*U. scabra* var. *p.* Dipp.)—Var. **atropurpúrea** Rehd. Lvs. dark purple. (*U. montana* var. *a.* Spaeth.) Orig. about 1883.—Var. **lutéscens** Rehd. Lvs. yellow. (*U. scabra* var. *l.* Dipp.)—Var. **cornùta** Rehd. Lvs. obovate, often broadly so and at least on vigorous brts. with 3 or sometimes 5 acuminate lobes at the broad

apex; brts. hirsute, red-brown in autumn. H.W.3:7,f.231a. (*U. campestris c.* David, *U. scabra tricuspis* K. Koch, *U. glabra* f. *grandidentata* Moss, *U. triserrata* or *tridens* Hort., *U. mont.* var. *laciniata* Hort., not Maxim.) Orig. before 1845.—Var. **crispa** Rehd. Lvs. narrow, incisely serrate, with twisted and incurved teeth: of slow growth. S.H.1:f.136y(l). (*U. mont.* var. *crispa* Loud., *U. aspleniifolia* Hort., *U. urticaefolia* Audib.) Orig. before 1800.—Var. **péndula** Rehd. Brs. horizontally spreading forming a low flat-topped head with long pendulous brts. G.C.III.50:221(h). Gn.86:579(h). E.H.7:t. 393(h). (*U. mont.* var. *p.* Loud., *U. mont.* var. *horizontalis* Kirchn.) Orig. about 1816.—Var. **camperdòwnii** Rehd. With pendulous brs. and brts. forming a globose head. G.C.III.50:221(h). (*U. mont.* var. *pendula Camperdowni* Henry, *U. mont. pendula* Kirchn., not Loud.) Orig. before 1850.—Var. **fastigiàta** Rehd. With strictly upright brs. forming a narrow columnar head; lvs. smaller, broadly obovate, coarsely and deeply serrate, wrinkled above and often twisted. L.A.7:t.187a(h). (*U. mont.* var. *f.* Loud., *U. plumosa pyramidalis* Hort., *U. exoniensis* Hort.) Orig. before 1826.—Var. **nàna** Rehd. A dwarf slow growing form with stunted brts. and small lvs., forming a rounded bush rarely more than 2 m. tall. Orig. before 1869.—Var. **nítida** Rehd. Glabrous form with glabrous brts. and glabrous lvs. smooth above. (*U. mont.* var. *n.* Syme.) Spontaneous in Scand. and Eng. Intr.?

U. g. × *foliacea* = *U. hollandica;* see No. 10.—*U. g.* × *pumila* = **U. arbúscula** Wolf. Shrubby tree with elliptic to elliptic-oblong lvs. 2–7 cm. long (but much longer on shoots), nearly equal at base, doubly serrate. Orig. 1902.

A related species is **U. ellíptica** K. Koch. Tree with pubescent brts.; lvs. elliptic to elliptic-oblong, 8–14 cm. long, nearly smooth above, slightly pubescent beneath: fr. obovate, pubescent in the middle. Wolf & Palibin, Opr. Der. Kust. 626(l). Transcauc., Armenia. Intr.?—In China *U. glabra* is represented by **U. Bergmanniàna** Schneid. Tree to 23 m.; brts. glabrous: lvs. very short-petioled, obovate-oblong to elliptic, 7–12 cm. long, glabrous: fr. roundish-obovate, about 1.5 cm. long. S.H.2:f.565a-b,566a-b. C. China. Intr. 1900. Zone V?—Var. **lasiophýlla** Schneid. Lvs. pubescent beneath. W. China. Intr. 1908. Zone V?

7. **U. laciniàta** Mayr. Tree to 10 m., rarely taller; brts. glabrous or sparingly hairy when young, becoming pale yellowish brown or grayish brown in autumn: lvs. obovate or obovate-oblong, 8–18 cm. long, at the broad apex usually with 3 or sometimes with 5 lobes, very unequal at base, doubly serrate, rough above, usually soft-pubescent beneath; petioles 2–5 mm. long: fls. in dense clusters: fr. elliptic, about 2 cm. long, glabrous; seed in the middle. S.I.2:t.15(c). C.C.111. (*U. mont.* var. *l.* Trautv., *U. mont.* var. *heterophylla* Maxim.) Manch., N. China, Japan. Cult. 1900. Zone V.—Var. **nikkoénsis** Rehd. Lvs. obovate, 6–11 cm. long, sparingly short-pubescent on the veins and veinlets beneath, purple when unfolding. C. Japan. Intr. 1905.—Tree with large lvs. It has been much confused with *U. glabra cornuta* which may be readily distinguished by the hairy brts. reddish brown at maturity and the presence of the 3-lobed lvs. chiefly on vigorous shoots, while in this species they are present also on fruiting brts.

8. **U. procèra** Salisb. English E. Tall tree to 40 or even 50 m.; suckering; bark deeply fissured; young brts. pubescent, sometimes developing corky wings; buds ovoid, minutely pubescent: lvs. ovate or broad-elliptic, 5–8 cm. long, short-acuminate, very oblique at base, doubly serrate, with about 12 pairs of veins, dark green and scabrous above, soft-pubescent beneath and with axillary tufts; petioles 4–6 mm. long, pubescent: fls. short-stalked; stamens 3–5; stigmas white: fr. suborbicular, about 1.2 cm. across, with a small closed notch at apex; seed close to the notch. S.E.8:t.1285(c). Em.2: 336(h). M.G.15:577(h). E.H.7:t.404,405(h),412,f.14. (*U. campestris* Mill.,

U. surculosa var. *latifolia* Stokes.) Eng., w. and s. Eu. Early intr. to Am. Zone V.—Var. **argênteo-variegàta** Rehd. Lvs. striped and spotted with white. (*U. camp.* var. *variegata* Dipp., *U. camp.* var. *a.* West.) Orig. before 1770.—Var. **purpúrea** Rehd. Lvs. tinged dark purple. (*U. camp.* var. *p.* Kirchn.) Orig. before 1860.—Var. **purpuráscens** Rehd. Lvs. small, 2–3 cm. long, tinged purple. (*U. camp.* f. *p.* Schneid., *U. camp.* var. *myrtifolia purpurea* De Smet.) Orig. before 1877.—Var. **Vanhoûttei** Rehd. Lvs. tinged with yellow. (*U. camp.* f. *V.* Schneid., var. "Louis van Houtte" Hort.) Orig. about 1886.—Var. **Berárdii** Rehd. Bushy tree with slender upright brs.: lvs. elliptic-oblong, 1.5–3 cm. long, with few coarse teeth, glabrous; petiole and brts. pubescent. S.H.1:f.136l–m. (*U. camp.* var. *B.* Simon-Louis.) Orig. 1863. Of this Elm the fr. is unknown and it may belong to *U. foliacea.*—Var. **viminàlis** Rehd. Tree with ascending brs. and pendulous brts. slightly pubescent while young: lvs. obovate to narrow-elliptic, 2–6 cm. long, acuminate, incisely doubly serrate, scabrous above, slightly pubescent beneath: fr. unknown. G.C.III.51:236. S.H.1:f.215n–o. (*U. camp.* var. *v.* Loud., *U. antarctica* Kirchn., *U. stricta* Hort., not Lindl.) Orig. 1817.—Var. **aûrea** Rehd. A form of the preceding var. with yellow lvs. I.H.14:t.513(c). B.H. 16:t.19(c). (*U. Rosseelsii* Hort., *U. camp. a.* Morr.) Orig. before 1866.—Var. **marginàta** Rehd. A form of var. *viminalis* with the lvs. variegated creamy white near the margin. (*U. camp. viminalis m.* Kirchn., *U. camp.* var. *viminalis variegata* Nichols.) Orig. before 1860.—Var. **austràlis** Rehd. Lvs. thicker and firmer, prominently veined beneath, more cuspidate-acuminate. E.H.7:t.412,f.17. (*U. camp.* var. *a.* Henry.) S. Eu.—Tall tree with straight nearly excurrent stem and spreading or ascending brs. forming an oval or oblong head. Much planted in England and also in this country particularly in the N. E. States. The lvs. remain green several weeks longer than those of the American Elms.

9. **U. japónica** Sarg. JAPANESE E. Tree to 30 m.; young brts. densely pubescent and tuberculate, pale yellowish brown, sometimes developing corky wings: lvs. obovate or elliptic, 8–12 cm. long, acuminate, doubly serrate, with 12–16 pairs of veins, scabrous and pubescent above, pubescent beneath with small axillary tufts; petioles 4–5 mm. long, densely pubescent: fls. nearly sessile; stamens 4: fr. obovate-elliptic, about 2 cm. long, gradually narrowed at base; seed touching the open notch. S.I.2:t.101(c). G.F.6:327(h). (*U. campestris* var. *j.* Rehd.) Japan, N. E. Asia. Intr. 1895. Zone V.

Related species are: **U. Davidiàna** Planch. Medium-sized tree, brs. usually with 2 broad corky wings; brts. glabrous, becoming pale grayish brown: lvs. short-petioled, broad-obovate or elliptic-ovate, 5–10 cm. long, slightly pubescent beneath: fr. pubescent in the middle. S.H.2:f.565i,566i. N. China. Probably not in cult. Zone V.—**U. Wilsoniàna** Schneid. Tree to 25 m.; young brts. pubescent, becoming brown and often corky: lvs. elliptic or elliptic-obovate, 4–10 cm. long, smooth above, finely pubescent or nearly glabrous beneath: fr. obovate, glabrous. S.H. 2:f.565e,566c–d. C. China. Intr. 1910. Zone V.

10. ×**U. hollándica** Mill. Under this name are united here a number of Elms which are apparently hybrids between *U. glabra* and *U. foliacea.* They are more or less intermediate between these two species and resemble sometimes more the first sometimes more the second parent. (*U. Dippeliana* Schneid.) As the type of this group may serve the following variety which probably is not different from Miller's *U. hollandica.*—Var. **màjor** Rehd. DUTCH E. Tree to 40 m. with short trunk and wide-spreading brs. and often pendulous brts.; suckering; bark deeply fissured; young brts. glabrous or with few hairs: lvs. elliptic-ovate or broad-elliptic, 8–12 cm. long, acumi-

nate, very unequal at base, with 12–14 pairs of veins, lustrous dark green and nearly smooth above, sparingly and minutely pubescent and glandular beneath, with conspicuous axillary tufts; petioles 6–10 mm. long: fls. usually 4-merous: fr. elliptic-obovate, 2–2.5 cm. long; the seed touching the notch. R.I.12:t.662(c., as *U. montana*)? E.H.7:t.42,f.15. (*U. m.* Smith, *U. camp.* var. *m.* Planch., *U. scabra* var. *m.* Guerke.) Of unknown origin.—Var. **végeta** Rehd. HUNTINGDON E. Tall tree with usually forked stem and rough bark; suckering; young brts. glabrous or sparingly hairy: lvs. elliptic, 8–12 cm. long, acuminate, very unequal at base, with 14–18 pairs of veins, smooth and glabrous above, glabrous below except small axillary tufts; petioles 6–8 cm. long: fr. elliptic-obovate with closed notch; seed above the middle. E.H.7:t.395(h),t.412,f.16. (*U. v.* Lindl., *U. glabra* var. *v.* Loud., *U. Huntingdoni* Hort.) Orig. about 1750.—Var. **bélgica** Rehd. BELGIAN E. Tall tree with straight stem and broad crown; bark rough; young brts. more or less pubescent: lvs. elliptic-obovate, often narrowly so, 8–12 cm. long, acuminate, very oblique at base, with 14–18 pairs of veins, slightly scabrous above, soft-pubescent beneath; petioles 4–6 mm. long: fr. elliptic, 2–2.5 cm. long, seed above the middle. E.H.7:t.412,f.18. (*U. b.* Burgsd., *U. latifolia* Poederle, *U. batavina* K. Koch, *U. camp.* var. *latifolia* Gillek., *U. hollandica* Spaeth, not Mill.) Orig. in Belgium; much planted in continental Eu.—Var. **Dumóntii** Rehd. Similar to the preceding, but with more ascending brs. forming a narrow head. (*U. belgica* var. *D.* Henry, *U. camp.* var. *D.* Mottet.)—Var. **Klemmer** Rehd. Tall tree with ascending brs. forming a narrow-pyramidal head; bark smooth; young brts. with short hairs: lvs. ovate, 5–10 cm. long, short-acuminate, oblique at base, with about 12 pairs of veins, glabrous but scabrous above, minutely pubescent beneath; petioles 5–10 mm. long: fr. with the seed close to the notch. (*U. camp.* var. K. Gillekens, *U. camp. Clemmeri* Hort., *U. Klemeri* Spaeth.) Orig. in Belgium where it is much planted.—Var. **supérba** Rehd. Narrow-pyramidal tree; bark smooth; young brts. glabrous: lvs. ovate or elliptic-obovate, 8–12 cm. long, very oblique at base, with 15–18 pairs of veins, glabrous and smooth above, glabrous below except small axillary tufts; petioles 6–8 mm. long, sparingly pubescent: fls. 5-merous: fr. elliptic, 1.5–2 cm. long, with the seed near the middle. (*U. montana s.* Spaeth, also of Morr.?, *U. s.* Henry, *U. praestans* Schoch.) Orig. in Belgium.—Var. **Dauvéssei** Rehd. Broad-pyramidal tree; brts. hairy: lvs. to 12 cm. long, very unequal at base, soft-pubescent beneath; petiole about 5 mm. long: fr. with the seed near apex. (*U. mont.* var. *D.* Nichols., *U. D.* Henry.) Orig. before 1877.—Var. **Pitteûrsii** Rehd. Vigorous growing tree with large broad-ovate lvs.; said to produce annual shoots to 3 m. long. B.H.2:133,166. (*U. P.* Kirchn., "Orme Pitteurs" Morr.) Orig. in Belgium.—Var. **péndula** Rehd. Tree with ascending brs. and pendulous brts., more or less pubescent when young; lvs. firm, elliptic, about 8 cm. long, long-acuminate, very unequal at base, glabrous and smooth above, sparingly pubescent beneath; petioles about 8 mm. long: stamens 3–5: fr. obovate, 2 cm. long, with open notch; seed above the centre. E.H.7:t.412,f.24. (*U. Smithii* Henry, *U. glabra* var. *p.* Loud.) Orig. in England before 1830.—The various hybrids are much planted in Europe, particularly on the continent as shade and street trees; they are mostly propagated by grafting or layering.

11. **U. foliàcea** Gilib. SMOOTH-LEAVED E. Tree to 30 m., suckering; bark gray, deeply fissured; brts. slender, glabrous or nearly so while young; buds minutely pubescent: lvs. elliptic to ovate or obovate, acuminate, very oblique

at base, doubly serrate, with about 12 pairs of veins, lustrous bright green and smooth above, glabrous beneath except axillary tufts, glandular while young; petioles 6–12 mm. long, usually pubescent: fls. in dense clusters; stamens 4–5; stigmas usually white: fr. elliptic or obovate, cuneate at base, rounded at apex; seed close to the closed notch. H.W.2:3,t.37(c, as *U. campestris*). R.I.12:t.664(c). S.E.8:t.1286(c). E.H.7:t.399, 401, 402(h). (*U. nitens* Moench, *U. glabra* Mill., not Huds., *U. campestris* var. *laevis* Spach, *U. surculosa* var. *glabra* Stokes.) Eu., N. Afr., W. Asia. Long cult. Zone IV. —A very variable species with many garden forms: Var. **variegàta** Rehd. Lvs. marked usually densely with rather small white spots. (*U. camp. v.* Dum.-Cours.)—Var. **péndula** Rehd. With slender pendulous brts. (*U. nitens* var. *p.* Henry.)—Var. **Webbiàna** Rehd. Narrow-pyramidal tree with ascending brs.: lvs. small, folded longitudinally. (*U. camp. W.* Lee.)—Var. **Dampièri** Rehd. Narrowly pyramidal tree: lvs. crowded on short brts., broad-ovate, deeply doubly toothed with crenately serrate teeth. (*U. camp. D.* Spaeth, *U. nitens* var. *D.* Henry.)—Var. **Wrèdei** Rehd. Like the preceding, but lvs. yellowish. M.G.13:160(h). S.H.1:f.136p. (*U. camp. Dampieri W.* Hort., *U. W. aurea* Hort.) Orig. about 1877.—Var. **stricta** Rehd. CORNISH E. Narrow-pyramidal tree, with ascending brs.; young brts. often pubescent at the nodes: lvs. elliptic or broad-obovate, 5–7 cm. long, dark green and smooth above; petioles about 8 mm. long, pubescent: stigmas pink: fr. narrower than in the type. E.H.7:t.397(h),412,f.20. (*U. s.* Lindl., *U. camp.* var. *s.* Ait., *U. camp.* var. *cornubiensis* Loud., *U. nitens* var. *s.* Henry.) S. W. Eng. Long cult.—Var. **Wheàtleyi** Rehd. JERSEY E. A form of the preceding with more stiffly erect brs. and broader lvs. less conspicuously tufted beneath: stigmas white. G.C.III.41:150(h). E.H.7:t.398(h),412,f.21. B.S.1:86,t(h). (*U. camp. W.* Simon-Louis, *U. nitens* var. *W.* Henry, *U. sarniensis* Lodd., *U. campestris monumentalis* Hort., not Rinz.—Wheatley or Guernsey E.)—Var. **umbraculífera** Rehd. Tree with dense globose head; brts. slender, slightly hairy when young: lvs. elliptic or elliptic-ovate, 3–7 cm. long, often slightly rough above; petiole 4–8 mm. long. Gt.30:t.1034(h). M.G.15:579(h). M.D.1910:72,73(h). S.L.414(h). (*U. camp.* var. *u.* Trautv., *U. densa* Litvin.) Turkest. Cult. 1879.—Var. **grácilis** Rehd. A form of the preceding with slenderer brs. and smaller lvs. (*U. camp. umbraculifera g.* Spaeth.)—Var. **Koopmánnii** Rehd. Similar to var. *umbraculifera* but with an oval head; brs. often corky; brts. paler: lvs. grayish green beneath; petiole 3–5 mm. long. (*U. K.* Spaeth.) Intr. from Turkest. before 1880.—Var. **suberòsa** Schneid. Usually shrubby; the stiff brs. with corky wings: lvs. smaller, often slightly rough above. R.I. 12:t.663(c). S.L.413(h). (*U. s.* Moench, not Ehrh., *U. camp.* var. *s.* Wahlb.) C. Eu.—Var. **propéndens** Rehd. A form of the preceding with somewhat pendulous brs. and small lvs. 2–3 cm. long. M.G.16:166(h). (*U. suberosa pendula* Lav., *U. glabra* var. *suberosa* f. *p.* Schneid.)—Var. **itálica** Rehd. Lvs. more coriaceous than in the type, with 14–18 pairs of veins, quite glabrous except axillary tufts beneath. E.H.7:t.411,f.9. (*U. nitens* var. *i.* Henry.) Italy. Probably tenderer than the type.—A tree with straight trunk and slender ascending brs. forming a pyramidal head, or spreading and forming a round-topped head; brts. often pendulous; foliage bright green.

12. **U. mínor** Mill. GOODYER E. Tree to 30 m.; suckering; brts. springly and minutely pubescent, glabrous the second year: lvs. elliptic to obovate, 3.5–6 cm. long, acute or acuminate, only slightly unequal and often cordate at base, doubly serrate, with 8–10 pairs of veins, dull green above and slightly scabrous and puberulous, densely pubescent beneath at first, later glabrescent,

with conspicuous axillary tufts: fls. very short-stalked; calyx with 4–6 pinkish lobes; stigmas pink: fr. narrowly obovate, 1–1.5 cm. long, with open notch. R.I.12:t.660(c). E.H.7:t.403(h),411,f.3. G.C.III.50:408(h),409;51:235. (*U. sativa* Moss, not Mill., *U. surculosa* var. *angustifolia* Stokes.) Eu.—A tree with few stout ascending brs. forming a narrow crown and with pendulous brts. Rarely planted.

13. **U. pùmila** L. Dwarf E. Small tree to 15 m. or shrub; bark rough; brts. slender, pubescent while young or nearly glabrous; stipules broad, often semicordate at base: lvs. elliptic to elliptic-lanceolate, 2–7 cm. long, acute or acuminate, usually nearly equal at base, nearly simply serrate, with the teeth entire or with only one minute tooth, dark green and smooth above, glabrous beneath, firm at maturity; petioles 2–4 mm. long: fls. very short-stalked; stamens 4–5; anthers violet: fr. obovate, 1–1.5 cm. long, deeply notched at apex; seed somewhat above the middle. C.C.109. Gn.65:133. S.H.1:f.137m–p,139i–k. U.S.Im.125:t.204(h). (*U. campestris* var. *p.* Maxim.) E. Siber., N. China, Turkest. Cult. 1860. Zone IV.—Var. **péndula** Rehd. Brts. slenderer, pendulous. U.S.Inv.43:t.2(h). (*U. parvifolia p.* Hort.)—Var. **pinnàto-ramòsa** Henry. Tree with slender spreading pinnately branched shoots: lvs. oblong-lanceolate, usually 3–5 cm. long; petiole pubescent when young. (*U. p.* Dieck.) Cult. 1894.—Var. **arbórea** Litvin. Tall tree, pyramidal while young: lvs. elliptic-ovate to ovate-lanceolate, usually 4–7 cm. long, the teeth with 1 or 2 small teeth on the lower edge, lustrous above; petiole 4–8 mm. long. (*U. turkestanica* Reg.) Turkest. Cult. 1906.

U. p. × *glabra* = *U. arbuscula* Wolf; see under No. 6.

Sect. 4. Micropteléa Spach. Fls. in autumn, fascicled; calyx deeply divided beyond the middle into 4–8 equal lobes: lvs. subpersistent or tardily deciduous.

14. **U. parvifòlia** Jacq. Chinese E. Small tree to 15 or sometimes to 25 m.; bark smooth; brts. pubescent; stipules linear-lanceolate, narrow at base: lvs. elliptic to ovate or obovate, 2–5 cm. long, acute or obtusish, unequally rounded at base, simply or nearly simply serrate, lustrous and smooth above, pubescent beneath while young, subcoriaceous at maturity; petioles 2–6 mm. long: fls. in August or Sept. in axillary clusters: fr. elliptic-ovate, about 1 cm. long, notched at apex; seed in the middle. S.I.1:t.37(c). M.O. t.36,f.165(h). R.H.1909:399(h). Mo. Bot. Gard. Bull. 11:t.31(h). (*U. chinensis* Pers., *U. Shirasawana* Daveau.) N. and C. China, Korea, Japan. Intr. 1794. Zone V.—Handsome tree with slender brs. forming a broad round head and with small lvs. changing late in autumn to red or purple or in milder climates remaining green into the winter.

A related species is **U. crassifòlia** Nutt. Cedar E. Tree to 25 m.; brs. often with 2 opposite corky wings: lvs. ovate to ovate-oblong, 2.5–5 cm. long, acute or obtuse, often nearly simply serrate, subcoriaceous: fls. in short-stalked, 3–5-fld. fascicles: fr. small. S.S.7:t.315. Miss. to Ark. and Tex. Intr. 1876. Zone VIII.

Sect. 5. Trichopteléa Schneid. Fls. in autumn, in pendulous glabrous racemes; calyx 6-parted to the base: fr. pubescent and ciliate.

15. **U. serótina** Sarg. Red E. Tree to 20 m.; brts. slender, glabrous or slightly puberulous at first, often developing irregular corky wings: lvs. oblong to oblong-obovate, 5–8 cm. long, acuminate, very oblique at base, doubly serrate, with about 20 pairs of veins, glabrous and lustrous above, pubescent on the veins beneath and somewhat reticulate; petioles about 6 mm. long; stipules narrowed from a broad clasping base, persistent nearly until the lvs. are fully grown: fls. in Sept., axillary in pendulous racemes about 3 cm. long: fr. elliptic, 1–1.5 cm. long, deeply notched, densely ciliate.

S.S.14:718. Ky. to Ala., n. Ga. and Ill. Cult. 1903. Zone V.—Tree with spreading or pendulous brs. forming a broad handsome head; sometimes planted as a street tree in Ga.

2. **PLÀNERA** Gmel. Water-Elm. Deciduous tree; winter buds subglobose, minute: lvs. pinnately veined, serrate: fls. polygamo-monoecious; calyx deeply 4–5-lobed; staminate fls. in clusters at base of the young brts.; stamens 4–5; perfect fls. 1–3 in the axils of the young lvs.: fr. a small muricate drupe; cotyledons thick, unequal. (After J. J. Planer, 1743–1789; professor of medicine at Erfurt, Germany.) One species in N. Am.

P. aquática Gmel. Tree to 12 m.; brts. puberulous: lvs. ovate to ovate-oblong, 3–6 cm. long, acute, unequal at base, unequally serrate, at maturity glabrous, scabrate above; petioles 3–6 mm. long: fr. ellipsoid, about 8 mm. long, with irregularly crested fleshy ribs. Fls. with the lvs.; fr. IV–V. M.S.3:283,t.(c). S.S.7:t.316. R.H.1903:351(h). (*P. ulmifolia* Michx.) S. Ill. and Ky. to Fla. and Tex. Intr. 1816, but rare in cult. Zone VII?—Small tree with spreading brs. forming a low broad head. Often confused in European gardens with *Ulmus alata*, *U. parvifolia* and *U. campestris* var. *viminalis*.

3. **HEMIPTÉLEA** Planch. Deciduous tree; brts. often rigid and spinescent; winter-buds globose-ovoid, minute: lvs. very short-stalked, penninerved, simply serrate: fls. polygamous, short-stalked, in 1–4-fld. clusters on the young brts. in the axils of bracts and lower lvs.; calyx 4–5-parted; stamens usually 4; fr. a small oblique nutlet with a crest-like wing on the upper half; cotyledons broad. (Greek, *hemi*, half, and *ptelea*, the ancient Greek name of the elm; referring to the shape of the wing.) One species in N. E. Asia.

H. Davídii Planch. Shrubby tree; spines 1.5–10 cm. long, slender or stout, chiefly on young and shrubby plants; brts. slightly pilose or densely hairy while young, becoming brown or grayish brown: lvs. elliptic to elliptic-oblong, 2–5 cm. long, acute, subcordate at the narrowed base, simply and coarsely serrate, with 8–12 pairs of veins, at first with scattered hairs above each leaving a dark circular depression, sparingly hairy on the veins beneath; petioles 1–3 mm. long: fr. obliquely conical, 2-edged, winged on the upper half, about 6 mm. long. Fl. with the lvs.; fr. VIII–X. C.C.121. R.H.1913:29. M.O.35. S.H.1:f.141a–b. (*Zelkova D.* Hemsl. *Z. Davidiana* Bean, *Planera D.* Hance.) N. China, Manch., Korea. Cult. 1899. Zone V.—Small much-branched tree, often shrubby. In N. China used as a hedge plant.

4. **ZÉLKOVA** Spach. Deciduous trees or shrubs; bark rather smooth, scaly; winter-buds ovoid, acutish, glabrous, with many imbricate dark brown broad scales: lvs. short-petioled, penninerved, simply serrate: fls. polygamous, short-stalked, appearing on the young brts., the staminate ones clustered in the axils of the lower lvs. and bracts, the pistillate fls. solitary or few in the axils of the upper lvs.; calyx 4–5-lobed; stamens 4–5; style excentric; fr. a short-stalked drupe oblique and broader than high; cotyledons broad. Fls. in spring with the lvs.; fr. in autumn. (Zelkoua or Tselkwa, the Caucasian vernacular name of *Z. carpinifolia*.) Syn.: *Abelicea* Reichenb. Five species, including a doubtful one, in W. and E. Asia.

A. Lvs. acute, crenately serrate, pubescent on the veins beneath.....1. *Z. carpinifolia*
AA. Lvs. acuminate, sharply serrate, nearly glabrous beneath.....2. *Z. serrata*

1. **Z. carpinifòlia** K. Koch. Tree to 25 m.; brts. slender, pubescent: lvs. elliptic to oblong, 2–5, rarely to 9 cm. long, acute, rounded or subcordate at

base, coarsely crenate-serrate, with 6–8 pairs of veins, dark green and smooth or somewhat rough above, pubescent on the veins beneath; petioles 1–2 mm. long: fr. about 5 mm. across. E.N.III.1:65. Gn.24:371. E.H.4:t.249(h). B.S.2:694,t(h). (*Z. crenata* Spach, *Z. ulmoides* Schneid., *Planera Richardii* Michx., *Abelicea ulmoides* Ktze.) Cauc. Intr. 1760. Zone VI.—A tree with short trunk dividing into a number of upright stems, with spreading or half-spreading brs. forming an ovoid or oblong head and with small foliage.

The related **Z. Abelicea** Boiss. (*Z. cretica* Spach) with small coriaceous lvs. pubescent beneath from Crete is apparently not in cult., and probably would not be hardy n. of zone VII.

2. **Z. serràta** Mak. Tree to 30 m.; brts. usually glabrous: lvs. ovate to oblong-ovate, 3–6, or on shoots to 12 cm. long, acuminate, rounded or subcordate at base, sharply serrate with acuminate teeth, with about 8–14 pairs of veins, somewhat rough above, glabrous or nearly so beneath; petioles 2–5 mm. long: fr. about 4 mm. across. S.I.1:t.36(c). G.F.6:325. S.H.1:226(b). S.L.432(h). H.B.3:483(h). E.H.4:t.250(h). (*Z. acuminata* Planch., *Z. hirta* Schneid., *Z. Keaki* Mayr, *Z. cuspidata* Hort., *Planera acuminata* Lindl., *P. japonica* Miq.) Japan. Intr. about 1860, 1862 to Am. Zone V.—Handsome tree with short trunk dividing into many upright and half spreading stems with slender spreading brs. forming a broad round-topped head, with clean handsome foliage.

A closely related species is **Z. sínica** Schneid. Tree to 17 m.: lvs. ovate-oblong, 1.5–5 cm. long, obliquely rounded or broadly cuneate at base, crenate-serrate with usually 8–12 veins: fr. 5–6 mm. across. C. and E. China. Intr. 1908. Zone VI?—A rather doubtful species is **Z. Verschaffèltii** Nichols. Shrub or small tree: lvs. oval or ovate, 3–6 cm. long, with 6–9 pairs of coarse triangular teeth, rough above, pubescent beneath: fr. similar to that of *Z. carpinifolia*. S.H.1:f.141c. (*Z. japonica* var. *V.* Dipp., *Ulmus V.* Hort.) Cult. 1886. Possibly a native of the Cauc. and only a form of *Z. carpinifolia*.

5. **PTEROCÉLTIS** Maxim. Deciduous tree: lvs. 3-nerved at base: fls. much like those of Celtis; anthers pilose at apex; fr. a small nutlet, surrounded by a broad wing, usually emarginate at apex; cotyledons broad. (Greek *pteron*, wing and *celtis*; referring to the winged fr. by which it differs from Celtis.) Only the following species known.

P. Tatarinòwii Maxim. Tree to 16 m.: bark pale gray, peeling off in long flakes; brts. glabrous, chestnut-brown, with few small lenticels: lvs. ovate to ovate-oblong, 3.5–8 cm. long, acuminate, broad-cuneate at base, irregularly and sharply serrate, glabrous: fr. slender-stalked, suborbicular, 1.5–2 cm. across, emarginate at apex. S.H.1:f.146. C.C.116. V.F.205. M.O.397. N. and C. China. Intr. 1894. Zone V?—Tree with short trunk dividing into several ascending and spreading limbs with spreading brs. forming a broad wide-spreading head.

6. **CÉLTIS** L. Hackberry. Trees or rarely shrubs, deciduous, only the tropical and subtropical species often evergreen: bark usually gray, smooth, sometimes with corky warty excrescences; winter-buds small: lvs. 3-nerved at base, serrate or entire; petioles usually fairly long: fls. polygamo-monoecious, appearing on the young brts., the staminate ones in fascicles toward the base, the perfect fls. above, solitary in the axils of the lvs.: calyx 4–5-lobed; stamens 4–5: fr. a subglobose or ovoid drupe with a firm outer coat, usually scanty pulp and a bony stone with smooth or sculptured surface; embryo with broad folded cotyledons. Fls. with the lvs.; fr. ripening in autumn and often remaining long after leaf-fall. (The ancient Greek name of a tree with sweet fr.) About 70 species in the temp. regions of the n.

hemisphere and in the tropics; the species cult. with us belong to the sect. Euceltis which contains more than 30 closely related species often difficult to distinguish.—The hackberries are planted as shade trees or for ornament, but do not present any striking ornamental features; a few have edible frs.

A. Lvs. entire or occasionally with few teeth: stone pitted.
  B. Lvs. ovate to oblong-lanceolate, long-acuminate, usually broad-cuneate at base, thin, glabrous: fr.-stalk longer than petiole....1. *C. laevigata*
  BB. Lvs. ovate to ovate-oblong, acute or short-acuminate, rounded or subcordate at base: fr.-stalk about as long as petiole.
    C. Lvs. strongly reticulate beneath: fr. orange....2. *C. reticulata*
    CC. Lvs. scarcely reticulate: fr. purple or tan-color....3. *C. pumila*
AA. Lvs. serrate (occasionally entire in No. 6).
  B. Lvs. acuminate.
    C. Lvs. glabrous or nearly so beneath (pubescent on the veins beneath and rough above in a var. of No. 4): fr. on stalks longer than the petioles.
      D. Lvs. green or yellowish beneath.
        E. Petioles slender, about 1 cm. long or longer; lvs. sharply serrate with acuminate teeth: stone pitted.
          F. Lvs. oblong-lanceolate, cuneate at base....1. *C. laevigata* var. *Smallii*
          FF. Lvs. ovate to oblong-ovate, rounded or subcordate at base..4. *C. occidentalis*
        EE. Petioles stout, less than 1 cm. long; lvs. serrate only above the middle.
          F. Brts. glabrous; lvs. perfectly glabrous and lustrous green on both sides, crenate-serrate: fr. purplish black; stone smooth....5. *C. Bungeana*
          FF. Brts. pubescent: lvs. with appressed hairs and dark green above, lighter beneath, serrate, sometimes entire: fr. orange; stone pitted....6. *C. Biondii*
      DD. Lvs. grayish or whitish beneath, sharply serrate except at base: fr. black; stone pitted....7. *C. jessoensis*
    CC. Lvs. pubescent beneath at least on the veins.
      D. Lvs. densely pilose only on the veins, usually serrate only above the middle: frs. several, short-stalked small, orange....8. *C. labilis*
      DD. Lvs. soft-pubescent beneath: frs. long-stalked, large, over 1 cm. long.
        E. Brts. and lvs. beneath grayish pubescent; lvs. sharply serrate except at base frs. black, on slender glabrescent stalks....9. *C. australis*
        EE. Brts. and lvs. beneath yellow-tomentose; lvs. serrate only above the middle: frs. orange, on stout tomentose stalks....10. *C. Julianae*
  BB. Lvs. rounded or truncate at apex and abruptly cuspidate, coarsely serrate, 5.5–11.5 cm. broad....11. *C. koraiensis*

1. **C. laevigàta** Willd. Mississippi H. Tree to 30 m.; bark light gray, usually covered with corky warts: brts. glabrous or pubescent at first: lvs. oblong-lanceolate, sometimes ovate, 5–10 cm. long, long-acuminate and usually falcate, broad-cuneate or rounded at base, entire or sometimes with a few teeth, dark green above, slightly paler beneath, glabrous, thin; petioles 6–10 mm. long: fr. 5–7 mm. across, orange-red or finally purple-black, on slender stalks 1–2 cm. long. S.S.7:t.318. G.F.3:41,f.9,11. M.M.7:225(h), 227(b). (*C. mississippiensis* Bosc, *C. integrifolia* Nutt.) S. Ind. and Ill. to Tex. and Fla. Cult. 1811. Zone V.—Var. **texàna** Sarg. Brts. often pubescent: lvs. ovate to ovate-lanceolate, 3.5–7 cm. long, thicker, often pubescent on veins beneath; petiole pubescent. S.M.325. Kans. to Mo. and N. Mex. Intr. 1922.—Var. **Smàllii** Sarg. Tree to 10 m.: lvs. sharply serrate. B.T.357. (*C. S.* Beadle.) N. C. and Tenn. to Ga. and Ala. Intr. 1909. Zone VII or VI?—Handsome tree with spreading often pendulous brs. forming a broad round head with bright green lvs.

2. **C. reticulàta** Torr. Small tree to 15 m. or shrub; brts. pubescent: lvs. ovate, 3–7 cm. long, acute or acuminate, rounded or subcordate at base, entire or with few coarse teeth above the middle, scabrous above, conspicuously reticulate and glabrous or somewhat pubescent beneath, form and thickish; petioles 5–10 mm. long: fr. 7–10 mm. across, orange-red, on stalks about 1 cm. long. G.F.3:41,f.12. S.M.323. (*C. mississippiensis* var. *r.*) Colo. and Tex. to Wash. and S. Calif. Intr. 1890. Zone V?—Small tree with rather rigid spreading brs. or spreading shrub; rarely cult.

A closely related species is **C. Douglàsii** Planch. Small tree: lvs. usually oblong-ovate, distinctly acuminate, sharply serrate to nearly entire: fr. on slender stalks

usually twice as long as the petioles. S.M.321,f.292. A.I.1:523. (*C. rugosa* Rydb.) Colo. to Wash. and Utah. Intr. 1898. Zone V.

3. **C. pùmila** Pursh. Shrub or small tree to 4 m.; brts. finely pubescent or at least puberulous while young: lvs. ovate to ovate-oblong, 3–8 cm. long, acute or short-acuminate, rounded or subcordate at base, smooth or slightly scabrous above, light green and nearly glabrous beneath, finely pubescent on both sides while young; petioles 5–10 mm. long: fr. dull orange to purplish, 6–8 mm. thick, on short stalks about as long as the petioles; stone subglobose, shallowly pitted. G.F.3:41,f.10. Bull.Torr.Bot.Club,27,t.33. (*C. occidentalis* var. *p.* Gray.) N. J. to Fla., w. to Kansas, Colo. and Utah. Intr. 1876. Zone V.—Var. **Deàmii** Sarg. Lvs. slightly pubescent on the veins beneath, rather thick: pedicels longer. Deam, Shrubs Ind.149. Ind. Intr. 1919.—Var. **georgiàna** Sarg. Shrub or tree to 10 m.: lvs. rugose above, pilose along the veins beneath and on petioles; pedicels puberulous. S.M.326. B.T.357. (*C. g.* Small.) N. J. to Fla., Ala. and Mo. Intr. 1906.

4. **C. occidentàlis** L. Tree occasionally to 40 m.; brts. glabrous or puberulous: lvs. ovate to oblong-ovate, 5–12 cm. long, acute to acuminate, oblique and rounded or broad-cuneate at base, serrate except at base, bright green and usually smooth and lustrous above, paler below and glabrous or slightly hairy on the veins; petioles 1–1.5 cm. long: fr. 7–10 mm. thick, orange-red to dark purple, on slender stalks longer than the petioles; stone pitted. S.S. 7:t.317. G.F.3:40,43(h). B.T.354(h). E.H.4:t.251(h). Que. to Man., s. to N. C., Ala. and Kans. Intr. 1656. Zone II.—Var. **canìna** Sarg. Lvs. narrower, oblong-ovate, 8–14 cm. long, long-acuminate, glabrous or rarely pilose on the veins beneath, usually light green; petiole to 1.8 cm. long. S.M.320. (*C. c.* Raf.) Que. to Ga. and Okl. Cult. 1898.—Var. **crassifòlia** Gray. Tree with pubescent brts.: lvs. 9–15 cm. long, usually cordate at base, scabrous above, pubescent on the nerves beneath, of firmer texture. H.H.192, 193(b). S.M.321,f.291. (*C. c.* Lam., *C. Audibertiana* Spach.) N. Y. to S. C., Tenn. and Kans. Intr. about 1825. Zone V.—Tree with straight trunk and spreading rather rigid or sometimes pendulous brs. forming a handsome round-topped head, and with bright green foliage turning light yellow in autumn; the var. *crassifolia* is of more vigorous growth and grows to a taller tree with darker foliage.

5. **C. Bungeàna** Bl. Tree to 15 m.; bark light gray, smooth: brts. glabrous: lvs. ovate to ovate-oblong, 4–8 cm. long, acuminate, usually rounded at the oblique base, crenate-serrate usually only above the middle, lustrous bright green and glabrous on both sides; petioles 5–10 mm. long: fr. subglobose, 6–7 mm. thick, purplish black, on a slender stalk 1–1.5 cm. long; stone smooth. C.C.113. S.H.1:f.147k,q,148q. E.H.4:t.267,f.11. (*C. Davidiana* Carr.) C. and N. China, Manch. and Korea. Intr. 1868. Zone V.—Handsome tree with spreading brs. forming a broad round head, and with bright green lustrous foliage.

A related species is **C. Tournefòrtii** Lam. Tree to 6 m. or shrub; glabrous: lvs. ovate, 3–7 cm. long, acute, rounded or subcordate at base, bluish or grayish green, sometimes slightly pubescent: fr. reddish yellow, about 8 mm. thick; its stalk about as long as the petiole. S.H.1:f.147m-p1,148p1-p2. (*C. orientalis* Mill., not L.) S. E. Eu., W. Asia. Intr. 1739. Zone V.—The closely related **C. glabràta** Stev. differs chiefly in the more acuminate and sharply serrate lvs. with cuneate base and in the slightly pitted stone. S.H.1:f.147l-l1,148s. (*C. Tournefortii* var. *g.* Boiss.) W. Asia. Cult. 1870. Zone VI?

6. **C. Biòndii** Pampan. Tree to 14 m. or shrub; young brts. rufous-tomentulose: lvs. ovate to narrow-elliptic, 5–10 cm. long, acuminate, usually broad-cuneate at the oblique base, crenate-serrate above the middle, some-

times entire, pubescent at first, at maturity nearly glabrous, dark yellowish green above, paler and somewhat reticulate beneath; petioles 3–8 mm. long: fr. often 2 or 3, orange, about 6 mm. across, on stalks 1–1.5 cm. long; stone minutely pitted. C. China. Intr. 1894. Zone VI.—On young plants the lvs. are usually abruptly contracted near the middle into a long and slender entire point.

A related species is **C. sinénsis** Pers. Tree to 20 m.: leaves broad-ovate to ovate-oblong, broad-cuneate at base, crenate-serrate, dark green and nearly smooth above, reticulate and nearly glabrous below; petioles about 1 cm. long: frs. solitary, dark orange, on stalks about as long as the petioles; stone pitted and ribbed. Icon. Pl. Koisik. 1:t.2,f.2. S.H.1:f.147r-r²,148r. (*C. japonica* Planch.) E. China, Korea, Japan. Intr. about 1793. Zone VI?

7. **C. jessoénsis** Koidz. Tree to 23 m.; young brts. pubescent: lvs. ovate to ovate-oblong, 5–10 cm. long, long-acuminate, usually rounded at base, sharply serrate except at base, dark green above, whitish or grayish green beneath and sparingly pubescent on the nerves or glabrous; petioles 6–10 mm. long: fr. black, about 8 mm. across, on stalks about 2 cm. long; stone pitted. Icon. Pl. Koisik. 1:t.2,f.1.(as *C. Bungeana*). Korea, Japan. Intr. 1892. Zone V.

A related species is **C. cerasífera** Schneid. Tree to 10 m.: lvs. broad-ovate to ovate-lanceolate, short-acuminate, rounded or nearly subcordate at base, coarsely crenate-serrate; petioles 1–1.5 cm. long: fr. about 1 cm. thick, black, bloomy, on stalks 2–2.5 cm. long. C. China. Intr. 1907. Zone V.

8. **C. làbilis** Schneid. Tree to 18 m.; brts. yellowish-tomentose; the short fruiting brts. dropping off in autumn or winter: lvs. ovate-elliptic to elliptic-oblong, 5–10 cm. long, short-acuminate, unequally rounded at base, crenate-serrate above the middle, dark green and sparingly appressed-pubescent above, paler or brownish beneath and somewhat reticulate, short-pilose on the nerves; petioles 5–8 mm. long: frs. usually 2–3, subglobose, 7–8 mm. across, on stalks 6–8 mm. long; stone slightly pitted and ribbed. C. China. Intr. 1907. Zone VI?—A tree with straight trunk and thin brs. forming an ovoid head easily distinguished by the dropping off of the short fruiting brts.

9. **C. austràlis** L. Tree to 25 m.; brts. pubescent: lvs. elliptic-ovate to oblong-lanceolate, 5–15 cm. long, long-acuminate, broad-cuneate or rounded at the oblique base, sharply serrate, scabrous and dark green above, soft-pubescent and grayish green beneath; petioles 5–15 mm. long: fr. dark purple, 1–1.2 cm. thick, sweet, on stalks 1.5–2.5 cm. long; stone pitted. H.W.3:11(h), t.40(c). S. Eu., N. Afr., W. Asia. Intr. 1796. Zone VII or VI?—Handsome tree with spreading brs. forming an ovoid round-topped head.

A closely related species is **C. caucásica** Willd. Lvs. rhombic-ovate, 3–8 cm. long: fr. dark reddish brown, smaller, on a stalk about 1.5 cm. long. S.H.1:f.147e-e²,148t. Cauc., W. Asia. Intr. about 1885. Zone VI?

10. **C. Juliànae** Schneid. Tree to 25 m.; brts. densely yellowish tomentose and hirsute: lvs. broad-ovate to ovate-elliptic, 7–14 cm. long, acuminate, rounded or cuneate at the oblique base, crenate-dentate usually above the middle, slightly scabrous above, yellowish green and soft-pubescent beneath, firm and thick; petioles 1–1.3 cm. long; stamens usually 5: fr. orange, globose-ovoid, 1–1.3 cm. thick; stone nearly smooth. C. China. Intr. 1907 to Am. Zone V.—Handsome tree with straight trunk and stout spreading brs. forming a round-topped head; easily distinguished by its dense yellowish pubescence and large lvs.

11. **C. koraiénsis** Nakai. Tree to 12 m.; brts. glabrous or sometimes pubescent, brown: lvs. orbicular-ovate to broad-obovate or obovate, 8–15 cm. long and 5.5–11.5 cm. broad, rounded or subcordate at base, truncate or

rounded and abruptly cuspidate at apex, coarsely serrate, the teeth near apex elongated, bright green above, glabrous or sometimes pubescent on the veins beneath; petioles 5–10 mm. long: fr. globose-ellipsoid, about 1 cm. long, dull orange; pedicels 1.5–2 cm. long. J.C.31:t.18. Yabe, Enum. Pl. Manch. t.2,f.4. Korea, Manch., N. China. Intr. 1923. Zone V.—Remarkable for the unusual shape of its large lvs. and the large fr.

7. **APHANÁNTHE** Planch. Deciduous or evergreen trees or shrubs: lvs. petiolate, serrate: fls. monoecious, unisexual, with the lvs., the staminate in axillary dense corymbs at base of the young brts., the pistillate fls. in the axils of the upper lvs., 5-, rarely 4-merous: fr. an ovoid or subglobose drupe; embryo involute with narrow cotyledons. (Greek *aphanes*, inconspicuous, and *anthe*, flower.) Three to 4 species in Australia and E. Asia.

A. áspera Planch. Deciduous tree to 20 m.: lvs. ovate to ovate-oblong, 5–9 cm. long, long-acuminate, 3-nerved and rounded at base, simply serrate, the veins straight, parallel, excurrent, scabrous from appressed hairs on both sides; petioles about 5 mm. long: fls. greenish: fr. globose, about 8 mm. thick, black, appressed-pubescent, short-stalked. S.I.1:t.37(c). S.H.1:f.154. (*Homoioceltis a.* Bl., *Homoceltis japonica* Hort.) Japan, E. China, Korea. Intr. about 1880. Zone VIII.—Handsome tree with a dense round head.

16. MORACEAE DC. MULBERRY FAMILY

Deciduous or evergreen trees or shrubs, or herbs, with milky juice: lvs. alternate, entire, serrate or lobed; stipules present, sometimes persistent: fls. monoecious or dioecious, small, regular, usually in spikes or heads or affixed to a variously shaped torus, or on the inside of a hollow receptacle; perianth of staminate fls. of 2–6, usually 4, free, or more or less united, parts; stamens as many as sepals and opposite, straight or inflexed and elastic; sepals of pistillate fls. 4, more or less united; stigmas 1 or 2; ovary superior or inferior, 1-celled, with one suspended, amphitropous ovule, rarely basal and orthotropous: fr. a small achene or drupe, usually enveloped by the fleshy perianth or on a fleshy gynophore, often assembled into an aggregate fr. (syncarp); embryo often curved; cotyledons thick, flat or folded, often very unequal.—About 55 genera and 1000 species, chiefly trop.

A. Fls. in spikes or heads: stipules free, not leaving a ring-like scar: lvs. folded or involute in bud.
  B. Lvs. serrate or dentate, undivided or lobed; brs. never spiny: staminate fls. in catkins; stamens inflexed.
    C. Syncarp ovoid to cylindric, fleshy, juicy: buds with 3–6 scales. . . . . 1. *Morus*
    CC. Syncarp globose; the frs. at maturity exserted on fleshy gynophores: buds with 2–3 scales. . . . . 3. *Broussonetia*
  BB. Lvs. with entire margin: brs. spiny: fls. of both sexes in heads or clusters: syncarp globose with a crustaceous rind.
    C. Lvs. undivided, 6–16 cm. long: fr. large: filaments inflexed. . . . . 2. *Maclura*
    CC. Lvs. mostly 3-lobed, 3–7 cm. long: fr. about 2.5 cm. across: filaments straight. 4. *Vanieria*
AA. Fls. in a hollow receptacle; filaments straight: lvs. entire or lobed, convolute in bud; stipules connate, enclosing the terminal bud, leaving a ring-like scar. . . . . 5. *Ficus*

1. **MÒRUS** L. Mulberry. Deciduous unarmed trees or shrubs; bark usually scaly; buds with 3–6 imbricate scales: lvs. undivided or lobed, serrate or dentate, with 3–5 nerves at base; stipules lanceolate, deciduous: fls. monoecious or dioecious, both sexes in stalked axillary pendulous catkins; calyx 4-parted; the filaments inflexed in bud, later partly inclosed by the involute sepals; stigmas 2: fr. an ovoid compressed achene, covered by the succulent white purple or black calyx, forming an ovoid to cylindric syncarp resembling a blackberry; seed albuminous; cotyledons oblong, equal. Fls. with the lvs.; frs. in late summer. (The ancient Latin name of the plant.) About 12 species

in the temperate and subtropical regions of the n. hemisphere.—Small trees or shrubs grown for their edible frs. or for their lvs. which constitute the chief food of the silkworm, or planted for ornament.

A. Lvs. glabrescent or only slightly pubescent below.
B. Stigmas sessile or subsessile: lvs. smooth above, with axillary tufts of hairs beneath: usually tree-like.....1. *M. alba*
BB. Stigmas borne on a distinct style: lvs. slightly rough above, without axillary tufts beneath: usually shrubby.....2. *M. acidosa*
AA. Lvs. pubescent beneath, scabrous above, usually large and undivided.
B. Lvs. deeply cordate, short-acuminate, pubescent beneath, chiefly along the veins. 3. *M. nigra*
BB. Lvs. truncate or slightly cordate at base, soft-pubescent beneath.
C. Fruiting catkins narrow-cylindric: lvs. coarsely serrate with broad short teeth. 4. *M. cathayana*
CC. Fruiting catkins ovoid to oblong: lvs. rather closely and sharply serrate..5. *M. rubra*

1. M. alba L. WHITE M. Tree to 15 m.: brts. slightly pubescent at first or glabrous: lvs. ovate to broad-ovate, 6–18 cm. long, acute or short-acuminate, rounded or cordate at base, coarsely toothed with often obtusish teeth, often variously lobed, light green and usually smooth above, pubescent on the nerves beneath or nearly glabrous; petioles 1–2.5 cm. long: pistillate spikes 5–10 mm. long, the staminate about twice as long: syncarp 1–2.5 cm. long, white, pinkish or purplish-violet, sweet, but insipid. Fl.v; fr.VII–VIII. R.I.12:t.657(c). H.H.196, 197(b). Koidzumi, Rev. Morus,t.10. G.C.III.75: 37(h). China, naturalized in other parts of Asia, in Am. and Eu. Zone IV–V.—A very variable species with many forms and varieties of which the following are the most important: Var. **macrophýlla** Loud. Lvs. large, 15–22 cm. long, undivided: fr. red. (*M. Morettiana* Jacq.)—Var. **skeletoniàna** Schneid. Lvs. regularly and deeply divided into narrow long-pointed lobes. S.H.1:f.151b. (Var. *laciniata* Beissn., not K. Koch.)—Var. **venòsa** Delile. Lvs. usually rhombic-ovate, cuneate at base, acute or acuminate or sometimes rounded at the apex, irregularly serrate, with strongly marked whitish veins. B.C.4:2070. S.H.1:f.151c. (Var. *nervosa* Loud., *M. urticaefolia* Hort.) —Var. **pyramidàlis** Ser. Tree of narrow pyramidal habit; leaves usually lobed. U.S.Im.36:3,t.(h). (Var. *fastigiata* Schelle.)—Var. **péndula** Dipp. With long and slender pendulous brs.; lvs. usually lobed. B.C.4:2070(h). M.G.17:27(h). Gn.86:648(h).—Var. **tatárica** Loud. Small tree with bushy head; lvs. small, 4–8 cm. long, lobed or undivided; fr. small, about 1 cm. long, dark red, sometimes white. B.C.4:2071. (*M. t.* L.) Supposed to be the hardiest form.—Var. **multicaùlis** Loud. Strong-growing shrub or bushy tree: lvs. large, 8–15 cm. long, undivided, dull and somewhat rough above, with obtusish teeth: fr. large, nearly black. Ann. Hort. Fromont,1,t.3. Koidzumi, Rev. Morus,t.8,9. (Var. *latifolia* Bur., *M. m.* Perrottet, *M. sinensis* Hort.)—Small tree with spreading brs. forming a round-topped head and with bright green foliage; the lvs. of this species are the chief food of the silkworm.

2. M. acidòsa Griff. Shrub or small tree to 8 m.; brts. glabrous: lvs. ovate, 6–15 cm. long, acute to long-acuminate, truncate or subcordate at base, sharply or sometimes crenately serrate, undivided or variously lobed, often deeply so, slightly scabrous above, minutely pubescent or nearly glabrous at maturity beneath; petioles slender, 1.5–4 cm. long, glabrous: fls. dioecious, staminate catkins 1.5–3 cm. long, the pistillate 5–10 mm. long; style nearly as long as the stigmas; syncarp 1–1.5 cm. long, dark red, juicy, sweet. Fl.IV–V; fr.VI–VII. S.1.2;t.6,f.1–11(c). Koidzumi, Rev. Morus,t,2,4. (*M. alba* var. *stylosa* Bur., *M. indica* Roxb., not L., *M. japonica* Bailey, not Sieb., *M. bombycis* Koidz.) China, Korea, Japan. Intr. 1907. Zone V.—A

broad shrub with spreading brs. or a small bushy tree; its lvs. are not used as food for the silkworm; the abundantly produced fruits are palatable.

A related species is **M. mongòlica** Schneid. Small tree or shrub: lvs. ovate to oblong-ovate, 8–16 cm. long, caudate-acuminate, cordate at base, coarsely serrate with cuspidate teeth, rarely lobed, smooth above, nearly glabrous: style distinct; fr. red or black. Koidzumi, Rev. Morus, t.1. (*M. alba* var. *m.* Bur.) China. Intr. 1907. Zone V.—Var. **diabólica** Koidz. Lvs. scabrid above, pubescent beneath, often deeply lobed. Koidzumi, Rev. Morus,t.1,f.a. Cult. 1923.

3. **M. nígra** L. Black M. Tree to 10 m.; brts. pubescent, becoming brown: lvs. broad-ovate, 6–12 or sometimes to 20 cm. long, acute or short-acuminate, deeply cordate at base, coarsely serrate, usually undivided, sometimes 2–3-lobed, dark green and scabrous above, lighter and pubescent beneath, chiefly along the veins; petioles 1.5–2.5 cm. long: fls. dioecious or sometimes monoecious, the staminate about 2.5 cm. long, the pistillate half as long; syncarp ovoid to oblong, 2–2.5 cm. long, dark red. Fl.v; fr. viii. R.I.12:t.658(c). B.S.2:86,t(h). M.D.1912:203(h),204, 205. G.W.18:434(h). W. Asia. Intr. 1548. Zone VI?—Tree with short trunk and widespreading brs. forming a broad, rounded, often irregular and picturesque head, with dark green foliage; sometimes grown for its fruit.

4. **M. cathayàna** Hemsl. Small tree to 8 m., or occasionally to 15 m., sometimes shrubby; bark gray, nearly smooth: brts. pubescent at first: lvs. ovate, 8–15 cm. long, short- or long-acuminate, truncate or rarely cordate at base, serrate with broad, often rounded teeth, sometimes 3-lobed, scabrous above, soft-pubescent beneath; petioles 1.5–3 cm. long, pubescent: staminate catkins 3–6 cm. long, pistillate about 2 cm. long: syncarp narrow-cylindric, 2–3 cm. long and about 7 mm. thick, white, red or black. C. and E. China. Intr. 1907. Zone V.—Small tree with widespreading numerous brs. forming a flattened, rounded head: its lvs. are not used for feeding the silkworm.

5. **M. rúbra** L. Red M. Tree to 20 m.; bark scaly, brown; brts. pubescent at first: lvs. broad-ovate to oblong-ovate, 7–12 or occasionally to 20 cm. long, abruptly long-acuminate, truncate or subcordate at base, rather closely and sharply serrate, scabrous or sometimes nearly smooth above, soft-pubescent beneath; petioles 2–3 cm. long, tomentose at first: staminate catkins 2–5 cm. long, pistillate 2–2.5 cm. long: syncarp 2–3 cm. long, finally dark purple, juicy. Fl.v; fr.vii–viii. M.S.3:232,t(c). S.S.7:t.320. H.H.198, 199(h). G.F.7:25(h). Mass. to Fla., w. to Mich., Neb., Kans. and Tex. Intr. 1629. Zone V.—Var. **tomentosa** Bur. Lvs. whitish-tomentose beneath, glossy above, Tex.—A tree with shòrt trunk and stout spreading brs. forming a broad round-topped head, with dark green, rather large lvs. turning bright yellow in autumn. Occasionally planted for its fruit valued as food for hogs and poultry. A large-fruited form is grown as Lampasas Mulberry.

2. **MACLÙRA** Nutt. Osage-Orange. Deciduous tree; brs. with axillary thorns; buds depressed-globose with few imbricate scales: lvs. slender-petioled, entire, involute in bud; stipules minute: fls. dioecious; calyx 4-lobed; staminate fls. pediceled in subglobose or sometimes elongated racemes on long peduncles axillary on spur-like brts.; stamens 4, the filaments inflexed in bud; pistillate fls. sessile in dense globose heads on short peduncles; ovary with a long filiform stigma: drupelets oblong, collected into a large globose syncarp covered by a mamillate rind; seed without albumen; cotyledons oblong, nearly equal. Flowering with the lvs.; fruiting in autumn. (After Wm. Maclure, an American geologist.) Syn.: *Toxylon* Raf. One species in N. Am.

M. pomífera Schneid. Tree to 20 m.; bark deeply furrowed, dark orange; brts. light green, soon glabrous, becoming light brown the first winter; spines 1–2.5 cm. long, stout: lvs. ovate to oblong-lanceolate, 5–12 cm. long, acuminate, broad-cuneate to subcordate at base, lustrous above, soon glabrous; petioles 3–5 cm. long: clusters of staminate flowers 2.5–3.5 cm. long; heads of pistillate fls. 2–2.5 cm. across: syncarp subglobose, 10–14 cm. across, orange; seeds nearly 1 cm. long. Fl.v–vi;fr.ix. N.S.1:t.37(c). S.S.7:t.322,323. H.H.202, 203(b). G.C.III.16:693. (*M. aurantiaca* Nutt., *Toxylon pomiferum* Raf.) Ark. to Okla. and Tex. Intr. 1818. Zone (V) or VI.—Var. **inérmis** Schneid. A form with unarmed brs. R.H.1896:33. (*M. aurantiaca* var. *i.* André.)—A medium-sized tree with erect and ultimately spreading brs. forming an open, irregular, round-topped head, with bright green lvs. turning clear yellow in autumn. The orange-like large frs. are a conspicuous feature of this tree. Often used as a hedge plant in the Middle West.

M. p. × *Vanieria tricuspidata* = *Macludrania hybrida;* see p. 200.

3. **BROUSSONÉTIA** Vent. Paper-Mulberry. Deciduous unarmed trees or shrubs; buds small, with 2–3 outer scales: lvs. petioled, serrate, undivided or lobed; stipules ovate-lanceolate, distinct, deciduous: fls. dioecious; the staminate in cylindric pendulous catkins, with 4-lobed calyx and 4 stamens inflexed in bud; pistillate fls. in globose heads; perianth tubular, including the stipitate ovary; stigma slender, filiform: syncarp a dense globose head consisting of the frs. with their persistent perianths and bracts; frs. exserted at maturity on a fleshy gynophore; endocarp crustaceous; cotyledons oblong, equal. (After T. N. V. Broussonet, a French naturalist; 1761–1807.) Three species in E. Asia.

A. Petioles 3-10 cm. long; lvs. pubescent. 1. *B. papyrifera*
AA. Petioles 1-2 cm. long; lvs. glabrescent. 2. *A. kazinoki*

1. **B. papyrífera** Vent. Tree to 16 m.; bark smooth, gray; brts. stout, pubescent: lvs. ovate, 7–20 cm. long, acuminate, cordate at base, coarsely dentate, often deeply lobed, particularly on young plants, scabrous above, grayish green and soft-pubescent beneath; petioles 3–10 cm. long: staminate catkins 6–8 cm. long: syncarps 2 cm. across, orange, the protruding frs. red. Fl.v; fr.ix. S.I.1:t.38(c). B.M.2358(c). H.H.200, 201(b). M.D.1915: t.24;1918:t.26(h). (*Morus p.* L.) China, Japan; occasionally naturalized from N. Y. to Fla. and Mo. Cult. 1750. Zone VI.—Var. **laciniàta** Ser. Lvs. finely dissected into narrow segments often reduced to the nerves and only at the ends with small narrow lfts. R.H.1878:374(h),375. Gn.15:53. S.L. 125(h). (Var. *dissecta* Hort., var. *Billiardii* Hemsl.)—Var. **leucocárpa** Ser. Fr. white.—Var. **variegàta** Ser. Lvs. variegated with white or yellow.—A small tree with widespreading brs. forming a broad rounded head; often planted for ornament and sometimes as a street tree.

2. **B. kazinòki** Sieb. Shrub to 5 m.; brts. slender, soon glabrous, purplish: lvs. ovate to ovate-oblong, 5–20 cm. long, long-acuminate, rounded or subcordate at base, serrate, sometimes 2–3-lobed, scabrous above, slightly pubescent beneath at first, later glabrous; petioles 1–2 cm. long: staminate catkins about 1.5 cm. long: syncarps about 1 cm. across, woolly. I.T.2:t.45. S.H.1: f.151i-k,155d-f. (*B. Sieboldii* Bl., *B. Kaempferi* Hort., not Sieb.) Korea, Japan. Intr. about 1844. Zone VII.

A closely related species is **B. Kaèmpferi** Sieb. Shrub with sarmentose brs. and smaller pubescent lvs. Blume, Mus. Bot. Lugd.-Bat.2:t.40. China, Korea. Japan. Intr. 1900. Zone VII?

4. **VANIÈRIA** Lour. Deciduous or evergreen trees or shrubs; brs. often thorny; stipules small, distinct; lvs. petioled, entire, sometimes 3–lobed: fls. dioecious in axillary globular heads; perianth of staminate fls. with 4 oblong segments and 2–3 bracts at base; stamens with 4 straight filaments; ovary of the pistillate fls. enclosed by the 4-parted perianth; stigma filiform: syncarp subglobose, fleshy: fr. with a crustaceous pericarp; seed with thin endosperm; cotyledons folded. (After Jacques de Vanière, French jesuit, author of "Praedium rusticum"; 1664-1739.) Syn.: *Cudrania* Trécul. Five or 6 species from China to Austr. and New Caled.

V. tricuspidàta Hu. Shrub or small tree to 8, rarely to 18 m.; brts. glabrous, with slender thorns 5–30 mm. long: lvs. ovate to obovate, 3–8 cm. long, acuminate, rounded at base, sometimes 3-lobed at apex (or tricuspidate on young plants), glabrous, dark green above; petioles 8–15 mm. long: fl.-heads short-stalked, solitary or in pairs; syncarp subglobose, about 2.5 cm. across, with a firm rugose rind, red. R.H.1872:56;1905:363(h). H.I.18:1792. Kew Bull. 1888:291,t. (*Cudrania t.* Bur., *Maclura t.* Carr., *Cudranus trilobus* Hance.) China, Korea, Japan. Intr. 1862. Zone VIII?—Bush or small tree with slender spiny brs. forming a rounded or flattened head; the lvs. are used in China for feeding the silkworm; the fr. is edible. Recently recommended as a hedge plant for the South.

A supposed hybrid of this species with *Maclura pomifera* is **Macludrània hýbrida** André. R.H.1905:362.

5. **FÌCUS** L. Fig-tree. Evergreen or rarely deciduous trees or shrubs; unarmed; stipules connate, enclosing the terminal bud, caducous and leaving a ring-like scar: lvs. alternate, rarely opposite, usually entire, rarely serrate or lobed, convolute in bud: fls. monoecious or rarely dioecious, borne inside of a hollow receptacle with a narrow orifice; the staminate fls. with a 2–6-parted perianth and 1 or 2, rarely 3–6 stamens; pistillate fls. usually with more segments; style eccentric, short or filiform; stigma peltate to filiform: syncarp subglobose, ellipsoid or pear-shaped, fleshy; fr. enclosed in the perianth; embryo curved, with equal or unequal cotyledons. (The ancient Latin name.) About 600 species in the trop. and subtrop. regions of both hemispheres.

F. càrica L. Fig. Deciduous tree to 10 m.; brts. stout, glabrous: lvs. 3–5-lobed, rarely undivided, 10–20 cm. long and about as broad, usually cordate at base, palmately nerved, the lobes usually obovate and obtuse at the apex and irregularly dentate, scabrous above and below with stout, stiff hairs; petioles 2–5 cm. long: receptacle axillary and solitary, pear-shaped, at maturity 5–8 cm. long, greenish or brownish violet. Fr.VII–X. G.O.t.108(c). B.C. 3,t.42(h). M.A.t.129, 130(h). W. Asia. Cult. since early times. Zone VII?—Usually a spreading shrub with long, sometimes procumbent brs., rarely a small tree with short stem and widespreading brs. forming a broad flattened head. Grown for its edible fruit which is of great commercial importance; many pomological varieties are distinguished. Caprification, the fertilization of the fig by the fig-wasp (Blastophaga), is not only a fascinating chapter of biology, but also of great practical importance; for a short account and further literature see B.C.3:1237 and G.C.III.50:267.

Of the evergreen species possibly **F. pùmila** L. may be grown in sheltered places in Zone VIII. A climbing or prostrate shrub clinging by rootlets: brts. densely strigose: lvs. of sterile brs. 2-ranked, very short-stalked, ovate to ovate-oblong, cordate at base, entire, 2–4 cm. long, those of fruiting branches generally oblong, 4–8 cm. long, on hirsute petioles 1–1.5 cm. long: fr. 4–5 cm. long. B.M.6657(c). R.H.1891: 448. (*F. stipulata* Thunb., *F. repens* Hort., not Rottb.) Japan, China. Intr. 1771.

17. URTICACEAE Wedd. NETTLE FAMILY

Herbs, shrubs or trees, with watery juice, sometimes with stinging hairs: lvs. alternate or opposite; stipules usually present: fls. monoecious or dioecious, rarely perfect, usually in axillary cymes, rarely solitary; perianth with 4–5 free or more or less connate segments; stamens as many and opposite the segments; filaments inflexed in bud, uncoiling elastically; ovary 1-celled, with one basal orthotropous ovule; style 1, stigma of various shape: fr. an achene or drupe; seed usually with copious endosperm; embryo straight; cotyledons fleshy, ovate or suborbicular.—More than 40 genera with about 500 species, chiefly trop.

A. Fr. dry: stigma linear: stipules free.....1. *Boehmeria*
AA. Fr. fleshy: stigma capitate and penicillate: stipules connate, bifid.....2. *Debregeasia*

1. **BOEHMÈRIA** Jacq. Shrubs, small trees or herbs: lvs. alternate or opposite, 3-nerved at base, serrate; stipules usually free: fls. monoecious or dioecious, in small clusters collected into axillary, usually lax and pendulous spikes or panicles: perianth of staminate fls. 3–5-lobed or -parted; stamens 3–5: pistillate fls. with tubular perianth, 2–4-toothed, inclosing the ovary; stigma filiform: achene crustaceous, inclosed by the perianth; cotyledons ovate. (After G. R. Boehmer, professor at Wittenberg; 1723–1803.) About 50 species in the tropics, also in N. Am. and E. Asia.

B. nívea Gaudich. RAMIE. Suffruticose, to 2 m.; brts. and petioles densely pilose: lvs. opposite, broad-ovate, 8–15 cm. long, acuminate, broad-cuneate to truncate at base, coarsely crenate-serrate, scabrid above, white-tomentose beneath and pilose on the nerves; petioles 2–8 cm. long, unequal: fls. monoecious, in long, often pendent, panicles 5–15 cm. long. Fl.VI–VIII; fr.IX–XI. Kew Jour. Bot.3:t.8. (*Urtica n.* L.) China, Japan, S. Asia. Cult. 1850. Zone (VI).—A bushy plant woody at the base, with long annual shoots. An important fibre plant cult. in La. and Fla.; sometimes planted as an ornamental perennial for its handsome lvs., snowy-white beneath.

2. **DEBREGEÀSIA** Gaudich. Shrubs or small trees: lvs. alternate, 3-nerved at base, serrate; stipules connate into a single bifid one: fls. monoecious or dioecious, in unisexual globose clusters arranged in axillary cymes; staminate fls. with usually 4-parted perianth and 4 short stamens; pistillate fls. with obovate or urceolate, 4-toothed perianth usually much contracted at the mouth; stigma capitate, penicillate: syncarp globose, consisting of fleshy drupelets; cotyledons short, broad. (Name of unknown derivation; probably named after a person.) Syn.: *Morocarpus* Sieb. & Zucc. Five species in E. and S. Asia, Abyssinia.

D. longifòlia Wedd. Shrub or sometimes small tree to 6 m.; brts. pubescent: lvs. lanceolate to oblong-lanceolate, 6–16 cm. long, acuminate, serrulate, rugose and scabrous above, white-tomentose beneath; petioles 5–15 mm. long: fr. 5–6 mm. across, orange to red, 2 or more on a short dichotomous peduncle. Fl.V–VI; fr.VI–VII. R.H.1896:321. G.C.III.39:232, suppl. (*D. velutina* Gaudich., *Conocephalus niveus* Wight.) China, Himal., Java. Cult. 1896. Zone VIII?—A spreading shrub with handsome foliage attractive on account of the striking contrast of the dark green lustrous upper and the snowy-white lower surface.

18. SANTALACEAE R. Br. SANDALWOOD FAMILY

Parasitic or half-parasitic (or independent?) herbs or shrubs, rarely small trees: lvs. alternate or opposite, undivided, sometimes scale-like; stipules

wanting: fls. perfect or unisexual; perianth simple, usually tubular at base, at apex 4–5-, or 3- or 6-lobed; disk epigynous or perigynous; stamens as many as perianth-lobes; anthers 2-celled; ovary usually inferior, 1-celled; ovules 1–4, at the apex of a central placenta: fr. a 1-seeded nut or drupe; seed without testa, with copious endosperm; cotyledons narrow, semi-terete, often short.—Twenty-seven genera with about 250 species in trop. and temp. regions.

A. Lvs. opposite: staminate fls. in umbels; pistillate solitary ..... 1. *Buckleya*
AA. Lvs. alternate: fls. in racemes or panicles ..... 2. *Pyrularia*

1. **BUCKLEŸA** Torr. Deciduous shrubs; buds acute with 3–5 pairs of outer scales; lvs. opposite, sessile or short-stalked, entire: fls. dioecious, terminal on short brts., the staminate in small terminal and sometimes also axillary umbels; stamens 4, opposite the sepals and much shorter; the pistillate fls. solitary, with 4 short deciduous sepals and immediately below but at the apex of the clavate calyx-tube with 4 linear-lanceolate persistent spreading bracts; style short, with 2–4-parted stigma; ovules 3–4: fr. an ellipsoid drupe. (After S. B. Buckley, an American botanist; 1809–1884.) Three species in Japan and China and one in N. Am.

B. distichophýlla Torr. Shrub to 4 m.: lvs. 2-ranked, sessile, ovate to ovate-lanceolate, 2–6 cm. long, acuminate, cuneate at base, nearly glabrous, ciliolate: fls. small, greenish: fr. ellipsoid, 1.2–1.5 cm. long, yellowish green or dull orange; the terminal bracts dropping at maturity. Fl.v; fr.IX. G.F. 3:237. N. C. and Tenn., parasitic on the roots of Tsuga. Intr. 1842. Zone V.—A graceful shrub with slender spreading brs. and bright green two-ranked narrow lvs. Cult. occasionally in botanical collections.

Nestrònia Raf. is a closely related genus differing chiefly in its axillary fls., simple stigma and in its globose fr. without enlarged persistent bracts. The only species is **N. umbéllula** Raf. Glabrous shrub to 1 m.: lvs. petioled, ovate or elliptic, 2–5 cm. long: fr. purple, about 1 cm. across. G.F.7:75. (*Buckleya umbellulata* Hieron., *Darbya umbellulata* Gray.) Va. to Ga. and Ala. Not known to be in cult.

2. **PYRULÀRIA** Michx. OIL-NUT. Deciduous shrubs or small trees; buds with many imbricate scales: lvs. alternate, entire: fls. subdioecious in terminal spikes or racemes, 4–5-merous; segments of perianth free above the disk, at base behind the short stamens with a tuft of hairs or a hairy scale: ovary inferior, with 2–3 ovules; stigma capitate: fr. a subglobose or obovoid drupe, rather large; seed subglobose; embryo terete, short. (Diminutive of Pyrus, in allusion to the shape of the fruit.) One species in N. Am., 2 in the Himal.

P. pùbera Michx. Shrub to 4 m.; the young parts puberulous; brts. stout: lvs. elliptic to obovate-oblong, 5–15 cm. long, acute or acuminate, cuneate at base, minutely punctulate; petioles 5–15 mm. long; staminate spikes many-fld., 2–6 cm. long, pistillate few-fld., short; fls. 5-merous: fr. pear-shaped or subglobose, about 2.5 cm. long, crowned by the ovate calyx-lobes, yellowish, containing an acrid oil as does the whole plant. Fl.v; fr.VIII–IX. B.B.1: 641. Pa. to Ga. and Ala.; parasitic on the roots of Tsuga. Cult. 1897. Zone VI?—Straggling shrub with rather large lvs.; of no particular ornamental merit; rarely cult. in botanical collections.

19. LORANTHACEAE Lindl. MISTLETOE FAMILY

Parasitic green shrubs or herbs, growing mostly on woody plants, rarely terrestrial; brs. usually brittle at base: lvs. opposite, sometimes reduced to scales, rarely alternate, entire, without stipules: fls. dioecious or monoecious,

terminal or axillary; perianth of 2–6 parts, simple, rarely differentiated into calyx and corolla and fls. perfect; stamens as many as parts of perianth and opposite: ovary inferior, 1-celled, with 1 orthotropous ovule; stigma 1: fr. a berry; seed without testa, with copious endosperm; embryo terete or angled. —About 21 genera with 600 species in trop. and temp. regions.—Of no economic importance and not objects of horticulture, though many trop. species are highly beautiful. Occasionally cult. in botanical collections.

A. Lvs. flat.
B. Lvs. deciduous, thin; brs. brown: parts of perianth 4–6 ..... 1. *Loranthus*
BB. Lvs. persistent, leathery: brs. green.
C. Fls. in axillary spikes; anthers free, 2-celled opening with a pore or slit. 2. *Phoradendron*
CC. Fls. 1–5 in terminal clusters; anthers adnate to the perianth-lobes, opening with many pores ..... 3. *Viscum*
AA. Lvs. scale-like; anthers 1-celled, free; fls. axillary ..... 4. *Arceuthobium*

1. **LORÁNTHUS** L. Parasitic trees or shrubs with usually brown terete brs.: lvs. opposite, rarely alternate: fls. perfect or unisexual; parts of perianth 4–6, valvate, spreading, sometimes connate below; filaments at least partly free; style filiform: berry globose or ovoid. (Greek *loros*, strap, and *anthos*, flower; referring to the shape of the sepals.) About 200 species in the Old World, chiefly trop.

L. europaèus L. Deciduous glabrous shrub to 1 m.; brs. dark brown: lvs. opposite, petioled, ovate-oblong, 2–4 cm. long, obtuse: fls. small, yellowish green, in short racemes: fr. about 8 mm. across, yellow. Fl.IV–V; fr. X–XII. R.I.24:t.142. C. Eu., chiefly on Oaks and Chestnuts.—Rarely cult. in European collections (see Jour. Bot. 11:90 for cult.).

2. **PHORADÉNDRON** Nutt. Parasitic shrubs with terete, angled or flattened green brs.: lvs. opposite, leathery, rarely reduced to scales: fls. usually dioecious, extra-axillary and sunk in the joints of axillary or terminal spikes; calyx usually 3-lobed, rarely 2–5-lobed; anthers 2-celled, sessile, opening lengthwise; stigma sessile or subsessile, obtuse: fr. a sessile subglobose berry. (Greek *phor*, thief, and *dendron* tree; referring to the parasitic habit.) About 240 species in N. and S. Am.

P. flavéscens Nutt. American Mistletoe. Much-branched shrub to 1 m., with terete brs.: lvs. short-petioled, oblong or obovate, 2.5–5 cm. long, obtuse, cuneate at base and 3–5-nerved: spikes axillary, 1–3, 1.5–2.5 cm. long; berry globose, 4–5 mm. across, white. Fl.IV–V; fr.X(–IV). B.B.1:639. Trelease, Gen. Phoradendron,t.24,25. (*Viscum f.* Pursh.) N. J. to Fla., w. to Ohio, Ind., Mo. and Tex. on various deciduous trees.—Collected and sold for Christmas greens. Not known to have been cult.

3. **ARCEUTHÓBIUM** Bieb. Small fleshy plants parasitic on coniferous trees: lvs. opposite, scale-like: fls. dioecious in the axils of the scales; staminate fls. with 2–5-parted calyx; anthers sessile, 1-celled, opening by a circular slit; pistillate fls. with 2-parted calyx-limb; style short, with obtuse stigma: fr. an ovoid, flattened berry on a short recurved pedicel. (Greek *arkeuthos*, Juniper, and *bios*, life; the European species lives on Juniper.) Syn.: *Razoumowskya* Hoffm. About 10 species throughout the n. hemisphere.

A. pusíllum Peck. Plant 0.5–2 cm. high, olive-green to brown: brs. nearly terete when fresh; scale-like lvs. suborbicular, appressed: berry ovoid-oblong, about 2 mm. long. Fl.IV–V; fr.IX. B.B.1:638. Rhodora 2:t.12–14. (*Razoumowskya p.* Kuntze.) Me. to N. Y. and Pa.; on Picea and Larix.—Cult. at the Arnold Arboretum by grafting infested brs.

4. **VISCUM** L. Mistletoe. Parasitic shrubs with green brs.: lvs. opposite, leathery: fls. monoecious or dioecious, axillary or terminal, 3–4-merous; anthers adnate to the inside of the calyx-lobes and opening with many pores; pistillate fls. with capitate stigma sessile or on a short style: fr. a globose berry, often with several embryos in one seed. (The ancient Latin name.) About 15 species in Eu., Asia, Afr. and Australia.

V. album L. Shrub to 1 m.; brs. terete, regularly dichotomous: lvs. subsessile, obovate to oblong, 3–5 cm. long, obtuse: fls. dioecious, yellowish, terminal, sessile, the staminate in 3–5-fld. clusters, the pistillate 1–3: berries globose, about 8 mm. across, white, translucent, in the angles of the forking brts. Fl.III–IV; fr.X(–III). R.I.24:t.139(c). S.E.4:t.635(c). S.H.1:f.161, 162l-o. Gn.89:107(h). Eu., N. Asia; on various dicotyledonous and coniferous trees, particularly on Malus, Populus and also Pinus.—This is the true Mistletoe and the fruiting brs. are imported as Christmas decoration. Often cult. in European botanical collections (for cult. see G.C.II.5:43;9:83. B.H.21:206. R.H.1887:470).

20. ARISTOLOCHIACEAE Lindl. BIRTHWORT FAMILY

Herbs or shrubs, often twining: lvs. alternate, often palmately veined, without stipules: fls. perfect, regular or symmetrical; perianth simple, connate, 3-merous, often petaloid; stamens 6–36, free and inserted on the ovary or united with the stylar column; styles connate, with 3 or 6 spreading stigmas; ovary inferior, rarely superior, 4–6-celled, each cell with several or many horizontal or pendulous ovules: fr. a capsule; seeds with copious endosperm and small embryo. Five genera with about 210 species, mostly in trop. and subtrop. regions.

ARISTOLÓCHIA L. Birthwort. Herbs or deciduous or evergreen shrubs, often twining; buds small, usually several, superposed, with few outer scales: lvs. usually cordate, 5–7-nerved at base, entire, rarely lobed: fls. axillary, symmetrical; perianth usually with long curved tube, inflated at base, constricted at the mouth and enlarged abruptly into a spreading limb, or gradually widened; stamens usually 6, adnate to the thick fleshy style; ovary 6, rarely 4- or 5-celled; style 3- or 6-lobed at apex: fr. a caps. dehiscent into 6 valves; seeds many, flat. (Greek *aristos*, very good, and *lochia*, child-birth, referring to the supposed medicinal virtues.) About 180 species in trop. and temp. regions of both hemispheres.

A. Plant glabrous or nearly so: lvs. 10–25 cm. long: limb of perianth brownish purple. 1. *A. durior*

AA. Plant more or less pubescent.

B. Lvs. at least ¾ as broad as long, generally ovate, never lobed.

C. Lvs. usually rounded at apex: limb of calyx yellowish ..... 2. *A. tomentosa*

CC. Lvs. pointed at apex: limb of calyx yellow, dotted with purple .... 3. *A. moupinensis*

BB. Lvs. variable, partly narrower, ovate to ovate-lanceolate, often lobed at base.

C. Pedicel with a leaf-like bract below the middle ..... 4. *A. heterophylla*

CC. Pedicel with a small bract ..... 5. *A. Kaempferi*

1. **A. dûrior** Hill. Dutchman's Pipe. Twining to 10 m.: brts. glabrous: lvs. reniform, 10–30 cm. long, pointed or obtuse, dark green and glabrous above, pale green beneath and pubescent at first, afterward glabrous; petiole 3–7 cm. long: fls. 1 or 2, axillary, on pedicels 3–5 cm. long, with a bract below the middle; calyx about 3 cm. long, its tube U-shaped, yellowish green and glabrous outside, constricted at the mouth and spreading into a 3-lobed smooth, brownish purple limb 1.5–2 cm. across; capsule 6–8 cm. long, 6-ribbed. Fl.V; fr.IX. B.M.534(c). G.F.5:509(h). Gn.28:585(h). M.G.13:373(h). (*A. macrophylla* Lam., *A. sipho* L'Hérit.) Pa. to Ga., w. to Minn.

and Kans. Intr. 1783. Zone V.—A vigorous climber with handsome, very large lvs.; an excellent vine for porches.

A closely related species is **A. manshuriénsis** Komar. Young brts. pubescent: lvs. 10–30 cm. long, acute or acuminate, sparingly hairy below at maturity: fr. 11 cm. long: fls. unknown. Manch. Intr. before 1909. Zone V.

2. **A. tomentòsa** Sims. Twining to 10 m.; brts. woolly: lvs. roundish ovate, 10–16 cm. long, usually rounded at apex, dull light green above and pubescent, more densely beneath; petioles 3–7 cm. long, woolly: fls. about 3.5 cm. long, the tube U-shaped, greenish yellow and pubescent outside, with a purple, nearly closed mouth and a reflexed yellow rugose 3-lobed limb about 2 cm. across: fr. about 5 cm. long, 6-ribbed. Fl.vi; fr.ix. B.M.t.1369(c). N. C. to Fla., w. to s. Ill. and Mo. Intr. 1799. Zone V.—A vigorous vine similar to the preceding but with somewhat smaller leaves of duller and lighter color.

A closely related species is **A. californica** Torr. Lvs. ovate to ovate-oblong, 5–10 cm. long, obtuse; petioles 1–2 cm. long: fls. little contracted at the mouth, slightly pubescent outside; limb 2-lipped, the upper lip of 2 obtuse lobes: fr. 4–5 cm. long, with 6 winged ribs. A.I.1:536. Calif. Intr. 1877. Zone VII or VIII?

3. **A. moupinénsis** Franch. Twining to 4 m.: brts. densely silky-pubescent, finally glabrous: lvs. broad-ovate, 7–12 cm. long, usually pointed at apex, slightly pubescent above, grayish pubescent beneath; petioles 2–5 cm. long: fls. about 3.5 cm. long; tube U-shaped, pubescent and greenish outside, with yellow mouth and a 3-lobed yellow limb dotted purple: fr. oblong, 7–8 cm. long, with 6 ridges. Fl.vi. B.M.t.8325(c). W. China. Intr. 1903. Zone VI?

4. **A. heterophýlla** Hemsl. Twining to 3 m.; brts. finely pubescent: lvs. ovate to ovate-oblong, or hastate-oblong, 4–10 cm. long, acute or acuminate, usually with a pair of rounded lobes at base, dull green above, pubescent beneath: fls. on nearly glabrous stalks 3–5 cm. long with a large leaf-life bract below the middle: calyx about 5 cm. long, U-shaped, yellow and pubescent outside, bright yellow inside the mouth, the limb lurid-purple, 3-lobed, the lower lobe rounded, flat, the 2 upper with recurved margins: fr. 5–7 cm. long, 6-ribbed. Fl.vi. W. China. Intr. 1904. Zone VI?—With less handsome foliage than the preceding species, but with strikingly colored flowers.

5. **A. Kaèmpferi** Willd. Tall climber; brts. pubescent; lvs. variable in shape, ovate to ovate-oblong, 8–15 cm. long, acute, often with a pair of rounded lobes at base, reticulate and silky-pubescent beneath; petioles 2–6 cm. long, pubescent: pedicel with a small bract; fls. with U-shaped tube, yellow outside, purple inside, with a 2-lipped limb, the upper lip emarginate. Fl.vi –vii. Kaempfer, Icon. Sel.t.49. Japan. Cult. 1854. Zone V.

21. POLYGONACEAE Lindl. BUCKWHEAT FAMILY

Herbs, shrubs or trees, sometimes twining: lvs. alternate, sometimes opposite or whorled, simple and usually entire; stipules usually united and forming a sheath (ochrea): fls. small, regular, unisexual or bisexual, solitary or collected into various inflorescences; perianth simple, of 2–6 parts, sometimes in 2 whorls, connate or distinct, persistent and sometimes accrescent; stamens usually 6–9, rarely less or more, usually opposite the sepals; ovary superior, consisting of 2–4 carpels, 1-celled, with 1 usually orthotropous ovule; styles 3, rarely 2 or 4: fr. a flat or angled achene, often inclosed by the accrescent calyx; seed with copious endosperm; embryo usually excentric, curved or straight.—Thirty genera with about 700 species, mostly in the temp. regions of the n. hemisphere, few in the Tropics and in the s. hemisphere.

A. Petioles without ochrea: fls. in involucrate clusters forming corymbs or umbels; stamens 9: small under-shrubs.....1. *Eriogonum*
AA. Petioles with ochrea: fls. in the axils of bracts forming racemes or panicles; stamens usually 6–8.
B. Upright shrubs: sepals 4 or 5, the 2 outer ones much smaller.....2. *Atraphaxis*
BB. Twining or rarely prostrate shrubs: sepals or perianth-lobes nearly equal.
C. Ochrea conspicuous, membranous: brs. without tendrils: fr. not inclosedb y the tubular part of the perianth.....3. *Polygonum*
CC. Ochrea very short, not membranous: brs. often with tendrils: fr. inclosed by the thickened tubular part of the perianth, its stipe-like base with a broad wing. 4. *Brunnichia*

1. **ERIÓGONUM** Michx. Annual or perennial herbs or subshrubs: lvs. often whorled, usually woolly; ochrea wanting: fls. small, usually perfect, in involucrate clusters forming corymbs or umbels, white, pink or yellow; involucre 5–8-lobed; sepals 6, equal or the outer ones larger; stamens 9; styles 3, with capitate stigmas: achene 3-angled. (Name formed analogous to Polygonum, from Greek *erios*, wool, referring to the woolly tomentum of most species.) About 150 species in W. N. Am.—Essentially plants of arid regions requiring in cult. well drained soil and sunny position; well adapted for sunny rockeries. Most species are herbaceous and the few suffruticose species are mostly of more southern distribution and probably not hardy above Zone VII or VI. The following is apparently the only one of these successfully intr. into cult., but descriptions of other suffruticose species likely to be introduced may be found in the floras of the western parts of N. Am.

E. Wrìghtii Torr. Subshrub to 60 cm., with slender brs. upright or procumbent: lvs. lanceolate or elliptic-lanceolate, 1–2 cm. long: fls. white or pink in terminal spike-like panicles 3–6 cm. long. Fl.VIII–IX. S.L.197(h). N. Mex. to Calif. Cult. 1904. Zone VII?—*E. umbellatum* Torr. and similar species can hardly be considered shrubby.

ATRAPHÁXIS L, Deciduous shrubs with unarmed or spinescent brs., glabrous: lvs. short-petioled, usually small, with a conspicuous membranous ochrea: fls. small, perfect, white or pinkish, several in the axils of often scale-like lvs., forming terminal racemes; sepals 5 or sometimes 4, the 2 outer smaller and usually reflexed; stamens 8, sometimes 6, connate at base; ovary superior; styles 2–3, free or connate at base: achene 2-edged or 3-angled, inclosed by the enlarged inner sepals; embryo excentric, slightly curved. (Ancient Greek name for Atriplex.) Syn.: *Tragopyrum* Bieb. About 18 species in C. and W. Asia, Greece and N. Afr.—Small shrubs of usually spreading habit with small lvs. and usually profusely produced white or pinkish fls. in terminal racemes remaining a long time nearly unchanged. Essentially desert plants requiring in cult. well drained soil and sunny position.

A. Sepals 4; stamens 6; fr. 2-edged: brs. rigid, often spinescent.....1. *A. spinosa*
AA. Sepals 5; stamens 8; fr. 3-angled: brs. unarmed.
B. Lvs. 1–3 cm. long.
C. Lvs. lanceolate.....2. *A. frutescens*
CC. Lvs. orbicular-ovate to broad-elliptic.....3. *A. buxifolia*
BB. Lvs. 2.5–8 cm. long, oblong-elliptic to oblong-lanceolate.....4. *A. Muschketowi*

1. **A. spinòsa** L. Rigid shrub to 50 cm., with whitish, usually spinescent, brs.: lvs. ovate to elliptic, 5–10 mm. long, bluish green: fls. about 8 mm. across, white, tinged rose, in small clusters on short lateral brts.; sepals 4, the inner 2 roundish, accrescent, closely appressed to the 2-edged fr. Fl.VIII. E.N.III.1a:23,f.12a-e. S.H.1:255. W. Asia, S. Russia. Intr. 1732. Zone V.

2. **A. frutéscens** K. Koch. Shrub to 80 cm., with slender whitish upright unarmed brs.: lvs. oblong to lanceolate or oblanceolate, 8–30 mm. long, acute, wavy at the margin, grayish green: fls. whitish, in small clusters at the end of the brts., forming racemes 2–7 cm. long; inner sepals suborbicular, in fr.

about 6 mm. across and pinkish. Fl.VIII–IX. L.B.5:489(c). B.R.3:254(c). (*A. lanceolata* Meissn., *Polygonum f.* L.) S. Russia to W. and C. Asia. Intr. 1770. Zone IV or III?—Attractive small shrub with profusely produced fls. in late summer, changing from white to pinkish.

A related species is **A. Billardièri** Spach. Low, usually prostrate shrub with often spinescent brts.: lvs. ovate to lanceolate, 3–5 mm. long, obtuse to acute, slightly wavy: fls. rosy-pink, in dense 5–8-fld. racemes. B.M.8820(c). G.C.III. 76:43. S. E. Eu., W. Asia. Cult. 1903. Zone V or VI?

3. **A. buxifòlia** Jaub. & Spach. Shrub to 60 cm., with rather short, sometimes slightly spinescent brs.: lvs. broad-obovate to broad-elliptic, 1–2.5 cm. long, acute or obtusish, with crisped and wavy margin: fls. pinkish-white, slender-stalked, forming short terminal racemes 2–4 cm. long; inner sepals orbicular, about 8 mm. across in fr. Fl.VII–VIII. B.M.1065(c, as *Polygonum crispulum*). Transcauc. to Turkest. Intr. about 1800. Zone V.

4. **A. Muschketôwi** Krassn. Shrub to 2.5, of open straggling habit: young brts. pale yellowish brown, older brown with shreddy bark: lvs. elliptic-oblong to oblong-lanceolate, 3–8 cm. long, acute, with crisped margin, light green: fls. white, about 1 cm. across, slender-stalked, in terminal leafy racemes 2–5 cm. long; accrescent sepals about 8 mm. across in fr. Fl.V–VI. B.M. 7435(c). B.S.1:225. G.C.III.78. (*A. latifolia* Koehne, *Tragopyrum lanceolatum* var. *latifolium* Reg.) Turkest. Intr. about 1880. Zone V.—This is the most ornamental species of the genus on account of its larger flowers and bright green foliage.

The closely related genus **Callígonum** L. consisting of small-leaved or nearly leafless shrubs resembling Ephedra in habit and appearance, is apparently not now in cult. It differs chiefly in the not accrescent sepals, in the larger fr. which is either 4-winged, as in **C. aphýllum** Schneid. (*C. Pallasia* L'Hérit.), or densely covered with branched setae, as in **C. polygonoìdes** L. These species are natives of W. and C. Asia and will be hardy within our area.

3. **POLÝGONUM** L. KNOTWEED. Herbs or shrubs often twining: lvs. alternate, petioled; ochrea conspicuous, membranous: fls. small, perfect, usually collected into large terminal spikes or panicles, rarely solitary; perianth 5-parted or 5-lobed, usually pinkish; the 3 outer parts often somewhat larger, accrescent and enclosing the fr. at maturity; stamens usually 8, rarely 5–7, adnate to a disk; styles 2–3, free or more or less connate; stigmas capitate: fr. compressed or 3-angled; embryo excentric, more or less curved; cotyledons narrow, not folded. (Ancient Greek name.) About 150 species throughout the earth, chiefly in temp. regions.

A. Prostrate subshrub: fls. in terminal spikes.....1. *P. vaccinifolium*
AA. Twining shrubs.
B. Axes of infl. nearly glabrous; fls. pinkish.....2. *P. baldschuanicum*
BB. Axes of infl. minutely scabrous-pubescent; fls. white.....3. *P. Aubertii*

1. **P. vaccinifòlium** Wall. Prostrate subshrub with long trailing and rooting brs., glabrous: ochrea laciniate, about 1 cm. long, brown; lvs. broad-elliptic to elliptic, 1–2 cm. long, acute at ends, dark green above, glaucescent beneath; petioles 4–6 mm. long: fls. rose-red, in short-stalked slender spikes 5–7 cm. long, borne on short upright brts. Fl.VIII–X. B.M.4622(c). Gn.45: 159(h);87:564(h). G.W.9:377(h). Himal. Intr. 1845. Zone VII?—A handsome trailing plant, forming carpets with numerous upright rosy-red fl.-spikes; well adapted for rockeries, likes moist position.

Other subshrubby species of probably about the same hardiness are the Californian *P. Bolanderi* Wats. and *P. shastense* Brew., but apparently not yet in cult. —A species little known in cult. is **P. equisetifórme** Sibth. & Sm. Subshrub to 1 m., with ascending striped brs. with lanceolate revolute lvs. 1.5–3 cm. long near the base, leafless above, and with conspicuous lacerate sheaths, resembling stems

of an equisetum: fls. white, in axillary clusters forming terminal spikes, in autumn. S.F.4:t.364(c). Gn.83:517(h);87:604(h). Mediterr. Reg. Intr. before 1912. Zone VIII?

2. **P. baldschuànicum** Reg. Twining woody climber to 10 or 15 m.; brts. glabrous, striped, green, older brs. gray: lvs. broad-ovate or ovate, 4–10 cm. long, acute or acuminate, cordate or hastate at base, glabrous, bright green; petioles 1–3.5 cm. long: fls. white, more or less tinged with pink, 6–8 mm. across, in large terminal panicles at the end of the brs. and of lateral brts.; axes of the panicle glabrous or nearly so; the 3 outer sepals winged on back, attenuated into a slender stipe; stamens pubescent at base; achene 3-angled, shining black. Fl.VII–IX; fr.IX–X. B.M.7544(c). Gt.37:t.1278(c). G.C.III.21:17&41:399(h). Gn.79:41(h). Gn.M.38:25(h). Bokhara. Intr. 1883. Zone V.—A handsome climber with pinkish fls. in large panicles often covering the upper part of the plant completely in late summer and autumn.

3. **P. Aubértii** L. Henry. Vigorous climber similar to the preceding, but less woody: lvs. ovate to oblong-ovate, 4–9 cm. long, hastate at base, usually undulate at margin, bright green, reddish when young; petioles 3–5 cm. long: fls. about 5 mm. across, whitish or greenish white, sometimes slightly pinkish, in numerous slender lateral panicles along the upper part of the brs.; anthers white; the axes of the panicle scabrid: the 3 outer sepals winged. Fl.VII–IX. R.H.1907:82,83. W. China. Intr. 1899. Zone V.—A vigorous climber with bright green dense foliage handsomer than that of the preceding species.

A related species is **P. multiflòrum** Thunb. Less woody: brs. hollow or nearly so: lvs. deeply cordate, 5–12 cm. long, long-acuminate; panicle smaller, slenderer, puberulous; fls. pink, 3 mm. across; stamens glabrous; outer sepals much enlarged in fr. S.H.1:f. 169i-m. Japan. Intr. 1881.—Less handsome, tenderer, blooming late.

4. **BRUNNÍCHIA** Banks. Climbing shrubs; the brts. partly ending in tendrils: lvs. petioled, entire; ochrea very short, not membranous: fls. perfect, small, in large terminal panicled racemes; sepals 5; stamens 7–10, usually 8; styles 3; stigmas 2-cleft at apex; ovule pendulous: fr. obtusely 3-angled, enclosed in the tubular enlarged perianth, below with a long stipe-like winged base; seed deeply 6-grooved, the embryo in one of the angles. (After M. T. Brunnich, a Scandinavian naturalist of the 18th century.) One species in N. Am. and one in W. Afr.

B. cirrhòsa Banks. Climbing to 8 m.; stems grooved: lvs. ovate to ovate-lanceolate, 5–15 cm. long, acute or acuminate, truncate or subcordate at base, slightly pubescent or nearly glabrous beneath; petioles about 1 cm. long: racemes 3–15 cm. long, forming large terminal panicles; fls. greenish white, 6–7 mm. across; achene oblong-ovoid, lustrous brown, about 6 mm. long, inclosed in the tubular perianth, with the stipe-like broad-winged base 2.5–3 cm. long. Fl.VII–VIII; fr.IX–X. E.N.III.1a:35,f.18a-d. B.B.1:677. S. C. to Fla., w. to Okl. and Tex. Intr. 1787. Zone VIII?—A vine with handsome dark green lvs.

22. CHENOPODIACEAE Dumort. GOOSEFOOT FAMILY

Herbs or shrubs, rarely small trees: lvs. usually alternate, entire or irregularly toothed, often fleshy, sometimes reduced to scales; stipules wanting: fls. small, usually greenish, bisexual or unisexual, regular; perianth simple, of 1–5 parts; stamens as many as perianth parts or fewer; ovary superior, 1-celled; ovule 1, amphitropous; styles or stigmas 2, rarely 3 or 4: fr. dry, rarely fleshy, inclosed by the variously shaped perianth; embryo coiled; cotyledons usually long and narrow. About 74 genera with 550 species distributed

all over the world.—None of the woody members of this family are of much horticultural importance, but as they are almost all plants of alkaline or saline soil, they are useful for seashore planting. The species mentioned below are occasionally found in botanical collections.

A. Lvs. alternate, rarely opposite.
  B. Lvs. lanceolate to obovate or ovate: fls. unisexual.
    C. Lvs. scurfy or mealy, often glabrescent, without hairs: fruiting bracts usually toothed. 1. *Atriplex*
    CC. Lvs. stellate-pubescent.
      D. Lvs. pubescent while young; fruiting bracts entire, glabrous. 2. *Grayia*
      DD. Lvs. persistently stellate-tomentose: fruiting bracts with 2 horns and densely pilose. 3. *Eurotia*
  BB. Lvs. linear or terete.
    C. Brs. slender: lvs. 4–10 mm. long: fls. bisexual.
      D. Plant pubescent: fr. inclosed in a 4-toothed hairy calyx. 4. *Camphorosma*
      DD. Plant glabrous: fr. inclosed in a 5-lobed calyx. 6. *Suaeda*
    CC. Brs. rigid, spinescent: lvs. 1.5–3 cm. long: fls. unisexual: fr. winged. 5. *Sarcobatus*
AA. Lvs. opposite, reduced to scales: fr. winged. 7. *Haloxylon*

1. **ÁTRIPLEX** L. Orach. Herbs or shrubs: lvs. alternate, scurfy, mealy or glabrous: fls. unisexual, sometimes mixed with perfect ones, in clusters usually forming terminal spikes or panicles; staminate fls. with 3–5-parted calyx, the pistillate with 2 large bracts and without calyx; stigmas usually 2: seed vertical with annular embryo, enclosed in the enlarged distinct or connate bracts. (Ancient Latin name of the plant.) About 120 species throughout the earth.

A. canéscens James. Shrub to 1.5 m. with whitish ascending or spreading brs.: lvs. subsessile, linear-lanceolate to oblanceolate or narrow-oblong, 2–5 cm. long, obtuse or acute, entire, grayish green: fls. usually dioecious, the staminate in simple or panicled spikes, the pistillate axillary or spicate: fruiting bracts united nearly to the apex, on each side with 2 longitudinal wings, undulate or dentate, 12–15 mm. broad. Fl.viii. B.B.2:19. Clements, Rocky Mt. Fl.t.10,f.1,2. Bull. U. S. Dept. Agr. Bot. 27,t.6,f.1. (*A. occidentalis* D. Dietr.) S. Dak. and Ore. to Tex. and L. Calif. Cult. 1870. Zone V.—Apparently one of the hardiest of the woody species in cult. and rather conspicuous by the grayish white or grayish green color of its foliage.

A closely related species is **S. Nuttállii** S. Wats. Suffruticose, with erect or decumbent stems: lvs. oblong or obovate to oblanceolate, 2–4 cm. long, obtuse, grayish green: fruiting bracts united to above the middle, 3–4 mm. long, indurate, irregularly dentate. B.B.2:19. Man. and Sask. to Neb. and Utah. Cult. 1880. Zone II?—Another related species is **A. confertifólia** S. Wats. Shrub to 1 m.: lvs. ovate to suborbicular, 1–2.5 cm. long, short-petioled: fls. dioecious in small axillary clusters; fruiting bracts united at base, entire, 6–12 mm. long. Jepson,Fl.Calif. f.83. Contr. U. S. Nat. Herb. 25:t.7a(h). N. Dak. and Ore. to Calif. Cult. 1894. Zone V?—The following two are European species: **A. Hálimus** L. Shrub to 2 m., with upright stout brs.: lvs. rhombic-ovate to ovate-oblong, 1.5–6 cm. long, acutish, silvery gray, petioled: fls. in large terminal panicles, greenish: fruiting bracts connate at base, entire. Fl.ix. R.I.24:t.270(c). S. Eu. Intr. 1640. Zone VIII?—Easily distinguished by its opposite lvs. is **A. portulacoïdes** L. Straggling shrub to 0.5 m.: lvs. obovate to oblong, about 1 cm. long, grayish: fls. greenish, in slender panicled spikes: fruiting bracts 3-lobed, tubercled. R.I.24:t.271(c) S.E. 8:t.1208(c). Seashores of Engl. and Denm. to Medit. Cult. 1800. Zone VII?

2. **GRAŸIA** Hook. & Arn. Deciduous shrubs; stellate-pubescent: lvs. alternate, entire: fls. usually dioecious; staminate fls. with 3–5-parted membranous calyx, in axillary clusters; pistillate fls. without calyx, inclosed by 2 connate bracts; stigmas 2: fr. nearly orbicular inclosed by a winged involucre; seed erect; embryo annular. (After Asa Gray, noted American botanist; 1810–1888.) Syn.: *Eremosemium* Greene. Two species in N. Am.

G. spinòsa Moq. Erect much-branched shrub, to 1 m.; brs. short, often

spinescent: lvs. narrow-oblong to oblanceolate, 0.5–4 cm. long, obtuse, pubescent while young, later glabrescent: staminate fls. in dense short spikes; pistillate fls. in dense spikes 2–7 cm. long: fruiting bracts suborbicular, 5–15 mm. long, glabrous, often tinged red. Fl.IV–V; fr.VII–VIII. H.I.t.271. Jepson, Fl.Calif.f.86. (*G. polygaloides* Hook. & Arn., *Eremosemium spinosum* Greene.) Wyo. and Wash. to Colo. and Cal. Cult. 1897. Zone V?

3. **EURÓTIA** Adans. Low shrubs or subshrubs with stellate pubescence: lvs. alternate, entire, narrow: fls. dioecious, or sometimes monoecious; the staminate fls. in clusters forming spikes; calyx 4-parted; stamens 4; pistillate fls. axillary, solitary or clustered, with 2 bracts connate below and without calyx; stigmas 2: fr. inclosed by the connate bracts forming a long-pilose, 2-horned coat; seed vertical; embryo nearly annular. (Greek *euros*, mould; referring to the pubescence.) About 4 species in N. Am. and in S. Eu. to C. Asia.

E. lanàta Moq. Subshrub to 1 m., with upright brs., like the lvs. with dense stellate pubescence mixed with simple hairs: lvs. short-petioled or subsessile, linear to lanceolate, 1.5–5 cm. long, obtuse, with revolute margins: fls. usually incompletely dioecious: fruiting bracts about 6 mm. long. Fl. V–VII; fr. VIII. B.B.2:20,f.1703. Jepson,Fl.Calif.f.87. Contr.U.S.Herb.25:t. 7*b*(h). Sask. and Wash. to Kans. and Calif. Cult. 1895. Zone V?—The long-pilose frs. give to the brs. of the fruiting plant a feathery appearance and make it quite attractive; also the gray foliage is distinctive.

The closely related **E. subspinòsa** Rydb. differs in the more woody brs. and in the uniform stellate tomentum devoid of simple hairs. It is apparently not in cult. and probably less hardy, being of more s. distribution.—The European **E. ceratoìdes** C. A. Mey. is similar, but differs chiefly in the somewhat broader, less densely pubescent lvs. greenish above, and with scarcely revolute margin. Mediterr. Reg. to C. Asia. R.I.24;t.273(c). S.H.1:264. S.L.201(h). Intr. 1780. Zone VI?

4. **CAMPHORÓSMA** L. Herbs or shrubs, often aromatic: lvs. alternate, terete or semi-terete: fls. perfect or pistillate, axillary and forming spikes; calyx campanulate, 4-toothed; stamens 4; style with 2, rarely 3 stigmas: fr. included in the campanulate calyx; seed upright; embryo horse-shoe-shaped. (*Camphora*, camphor, and Greek *osme*, odor.) About 7 species from the Mediterr. Reg. to C. Asia.

C. monspelíaca L. Subshrub to 0.5 m., with procumbent or ascending woolly brs.; aromatic: lvs. alternate, with clusters of smaller ones in the axils, 4–8 mm. long, subulate, pilose: fls. in dense ovoid to oblong spikes; calyx 2–2.5 mm. long, pilose; styles red: seed black. R.I.24:t.274(c). S. Eu. and N. Afr. to C. Asia. Cult. 1880. Zone VII?—Low shrubby plant of heath-like appearance adapted for seaside planting.

The related genus **Kochia** Roth may be mentioned here. Herbs or subshrubs, silky-pubescent: lvs. alternate: fls. perfect or pistillate, axillary, forming terminal spikes; calyx 5-lobed; stigmas 2–3: fruiting calyx depressed, with incurved lobes, winged on back; seed horizontal; embryo annular. About 30 species all over the earth. Possibly in cult. is **K. prostràta** Schrad. Subshrub to 0.6 m.: lvs. linear to filiform, 5–20 mm. long: fls. 3–5, axillary, forming leafy, panicled spikes: fruiting calyx 4–4.5 mm. across, each lobe with an oval to oblong striate horizontal wing on back. R.I.24:t.276(c). S.H.1:f.174. Mediterr. Reg. to C. Asia. Zone VI.

5. **SARCÓBATUS** Nees. Shrubs with spinescent brs. grayish or yellowish white: lvs. alternate or opposite, linear, fleshy: fls. monoecious or dioecious, without bracts; staminate fls. in cylindric catkins, each fl. consisting of a peltate scale, with 1–3 stamens underneath, without perianth; pistillate fls. sessile, axillary, 1 or 2; perianth turbinate, compressed, confluent with the ovary: fruiting calyx with a broad horizontal wing about the middle; seed

erect; embryo spirally coiled, without endosperm. (Greek *sarcos*, flesh, and *batos*, a spiny shrub.) Two species in W. N. Amer.

S. vermiculàtus Torr. Much-branched rigid shrub to 3 m., glabrous or pubescent: lvs. 1–3 cm. long, the lower ones opposite and shorter and broader: staminate catkins 7–30 mm. long: fr. minutely stellate-pubescent, its body 4–5 mm. long, with the wing above 1 cm. across. Fl.VI–VII. B.B.2:f.1709. E.N.III.1a:78. S.L.379(h). Alb. and N. Dak. to Calif. and N. Mex. Cult. 1895. Zone V.

6. **SUAÈDA** Forsk. Herbs or shrubs, upright or procumbent; lvs. alternate, terete, fleshy, glabrous: fls. sessile, in axillary 3-fld. cymes or solitary, with 2 minute bracts, perfect, mixed with unisexual ones; perianth subglobose or urceolate, 5-lobed; stigmas 2–5: fr. enclosed in the spongy or fleshy perianth, its lobes subequal or the 2 or 3 outer ones tubercular on the back, rarely all winged; embryo spirally coiled; endosperm wanting or scanty. (From the Arabian name of *S. baccata* "Suwed mullah.") Syn. *Dondia* Adans. About 40 species, essentially saline plants found on the seacoast of all continents and in inland regions with saline soil.

S. fruticòsa Forsk. Upright much-branched shrub to 1 m., glabrous, with whitish brs.: lvs. closely set, semi-terete, 5–15 mm. long, obtuse, grayish green: fls. solitary, rarely 3, greenish, small, the upper forming terminal leafy spikes; perianth subglobose, its lobes obtuse or acute, rounded on back; stigmas 3: fr. ellipsoid; seed ovoid, 1.6–1.8 mm. long, lustrous black. Fl.VIII–IX. R.I.24:t.289,f.1–6(c). S.E.8:t.1178(c). (*Dondia f.* Druce.) Alb. to S. Calif. and n. Mex., also W. and S. Eu., Asia, Afr. Cult. 1789. Zone V?—Low shrub of heath-like aspect, for planting in saline or sandy soil.

The related genus **Sálsola** L. may be mentioned here. Herbs usually annual, rarely shrubs: lvs. usually alternate, sessile or clasping, usually pubescent: fls. perfect, small, with 2 large bracts, axillary, solitary or clustered, the upper ones forming spikes; perianth 5-, rarely 4–6-parted, with oblong or lanceolate segments, in fruit usually horizontally keeled or winged, connate or free at base, usually inflexed at apex. About 40 species distributed nearly over the whole earth.—**S. larícina** Pall. Subshrub to 0.5 m., pubescent or glabrescent: lvs. subulate, 5–10 mm. long, obtuse: fls. solitary, in slender spikes; anthers with punctiform appendix: segments of fruiting calyx ovate-oblong, each below the middle with a reniform wing. Pallas, Ill.Pl.t.13. S. E. Russia to Siber. Cult. 1878. Zone IV?

7. **HALÓXYLON** Bge. Shrubs or small trees with articulate brs.: lvs. reduced to small scales: fls. perfect, axillary, with 2 broad bracts; sepals 5, free; stamens 2–5, inserted on a lobed disk; stigmas 2–5: fr. globose or cylindrical, surrounded by the accrescent sepals, all or some with a horizontal wing on back; seed horizontal; embryo spirally coiled. (Greek, *hal*, salt, and *xylon*, wood; referring to the saline habitat.) About 10 species from the Medit. Reg. to C. Asia.

H. ammodéndron C. A. Mey. SAXOUL. Shrub or tree to 6 m., with thick gnarled trunk; brts. light green, slender: scales short-triangular, obtusish, connate, puberulous inside: fruiting calyx with large suborbicular wings. Fl.v; fr.IX. E.N.III.1a:84,f.40a-g,t(h). Ledebour, Icon.t.47. Ural to Persia and Turkest. Intr. 1900. Zone V or VI?

A closely related genus is **Anábasis** L. Herbs or small shrubs: brs. articulate, with opposite, terete, often scale-like lvs.: fls. with small, sometimes subulate, bracts; stamens 5; fruiting calyx with horizontal wings, rarely without; seed vertical. About 18 species from the Mediterr. Reg. to C. Asia.—**A. aphýlla** L: Shrub to 0.5 m., with upright green brs.: lvs. scale-like, connate, pubescent inside, fls. axillary, forming terminal spikes: fruiting calyx with 3 wings. Pallas, Ill. Pl. t.8(as *A. tatarica*). S. E. Russia to the Altai and Songaria. Cult. 1878. Zone V?

The genus **Salicórnia** L. has also articulate brs. and scale-like opposite lvs., but it is succulent and scarcely woody. Herbs or subshrubs: fls. sunk in the fleshy joints; perianth 3–4-toothed, stamens 1 or 2: embryo conduplicate. About 10 species chiefly on the seashore throughout the earth.—**S. perénnis** Mill. has prostrate, suffruticose rooting stems. B.B.2:22. S.E.8:t.1183(c). (*S. ambigua* Michx., *S. radicans* Sm.) N. H. to Miss., W. Eu., Algeria. Cult. ? Zone IV?—**S. fruticòsa** L. has erect stems to 0.6 m. R.I.24:t.287(c). La., Bahamas, Old World. Intr. about 1800. Zone VII?

23. CARYOPHYLLACEAE Reichenb. PINK FAMILY

Herbs, rarely suffruticose; brs. usually swollen at the nodes: lvs. opposite, often connate at base, entire, with or without stipules: fls. regular and usually perfect, mostly in cymes; sepals 4–5, free or united; petals 4–5, sometimes wanting; stamens usually twice as many as sepals or fewer, hypogynous or perigynous; styles 2–5, sometimes united; ovary superior, 1-celled; ovules 1 to many attached to the base or on a free central placenta: fr. a dehiscent caps., or a 1-seeded utricle, rarely a berry; seeds albuminous, with coiled or curved, rarely straight embryo.—About 75 genera and 1200 species in both hemispheres, most abundant in temp. and colder regions; none of the suffruticose species are of particular ornamental or economic importance.

SILÈNE L. Catchfly, Campion. Annual or perennial herbs, sometimes suffruticose or shrubby: lvs. opposite, without stipules: fls. solitary or in cymes, white, pink or red; calyx 5-toothed or 5-cleft, ovoid to cylindric, 10 to many-nerved; petals 5, with a narrow claw and usually with a scale at base of blade; stamens 10; styles 3–5; caps. dehiscent, with 6–10 teeth at apex; seeds many. (Name probably derived from *Silenos*, companion of Bacchus in Greek mythology.) More than 400 species throughout the n. hemisphere.

S. chloraefòlia Sm. Woody at base, to 50 cm. tall, with upright or ascending brs., viscid above, otherwise glabrous and glaucescent like the lvs.: lower lvs. elliptic-spatulate, with the slender petiole 2–3 cm. long, upper sessile, suborbicular and acuminulate, 1–2 cm. across: fls. white or pinkish, slender-stalked in loose panicled cymes; calyx 10-nerved, glabrous, pale, 2.5–3 cm. long; petals bifid to middle of blade: caps. oblong, about 1½ as long as stipe. Fl.VII–VIII. B.M.807(c). B.R.1989(c). W. Asia. Intr. 1796. Zone VII.

Related species are: **S. fruticòsa** L. Woody at base: lvs. oblong-spatulate to oblanceolate, 2.5–6 cm. long, ciliate, grayish green: fls. pink, in panicles, with long-ciliate bracts; calyx glandular-pubescent; petals bifid at apex, pink; caps. about as long as its stipe. S.F.5:t.428(c). S. Eu. Cult. 1877. Zone VIII?—**S. Tánakae** Maxim. Suffruticose, upright, to 60 cm.: lvs. elliptic to lanceolate-spatulate, 2.5–6 cm. long, puberulous; calyx about 2 cm. long, puberulous; petals purple, emarginate, with ciliolate claws; caps. about as long as stipe. S. Japan. Intr. 1884. Zone VII?

Other genera with suffruticose species probably hardy within our area are the following: **Paronýchia** Juss. Herbs or subshrubs: lvs. linear, small, with scarious stipules: fls. small, often clustered, with minute petals or without: fr. a 1-seeded, indehiscent utricle. **P. Jamèsii** Torr. & Gr. is a subshrub to 30 cm. tall, from Wyo. and Neb. to Tex.—**Acanthophýllum** C. A. Mey. Subshrubs with linear, rigid and pungent lvs., without stipules: fls. sessile, usually in clusters with 5-nerved calyx and pungent calyx-teeth; petals without crown-scales; stigmas 2; caps. circumscissile, few-seeded. About 15 species in W. and C. Asia.

24. TROCHODENDRACEAE Prantl. TROCHODENDRON FAMILY

Trees or shrubs; buds large, acute with many imbricate scales: lvs. alternate, long-petioled, penninerved, serrate: fls. perfect, without perianth, in

fascicles or racemes; stamens numerous; carpels 5–many, free or immersed in the fleshy torus; stigmas linear; ovules 1 to many on the introrse ventral suture: fr. a samara or a dehiscent follicle; seed with copious endosperm and small embryo.—Two genera with 4 species in E. Asia.

A. Lvs. deciduous: fls. in small clusters before the leaves: fr. a samara.....1. *Euptelea*
AA. Lvs. evergreen: fls. in terminal racemes: fr. consisting of dehiscent follicles.
2. *Trochodendron*

1. **EUPTÉLEA** Sieb. & Zucc. Deciduous shrubs or small trees; buds with dark brown lustrous scales: lvs. dentate: fls. before the lvs., slender-stalked, in fascicles from axillary buds; stamens numerous with linear-oblong red anthers; carpels many, stipitate, oblique, with decurrent stigma, developing after the stamens have dropped; ovules 1 or few; carpels developing into stipitate obliquely winged samaras, 1–4-seeded. Fr. IX–X. (Greek *eu*, well, handsome and *ptelea*, elm; referring to the shape of the fruit.) Three species in E. Asia and Himal.

A. Lvs. coarsely and unequally dentate.....1. *E. polyandra*
AA. Lvs. fairly regularly sinuate-dentate.....2. *E. Franchetii*

1. **E. polyándra** Sieb. & Zucc. Shrub or tree to 15 m.; brts. reddish brown: lvs. roundish-ovate, 6–12 cm. long, cuspidate, broad-cuneate or nearly rounded at base, light green beneath, with a few scattered hairs on the veins; petioles 2–5 cm. long: carpels usually 1-seeded, with the slender stipe-like base 1.2–1.5 cm. long. S.Z.t.72(c). S.I.1:t.41(c). B.C.2:1174. Gng.16:162. Japan. Cult. 1877. Zone V.—Slender tree with handsome foliage reddish when unfolding, changing to red and yellow in autumn.

2. **E. Franchétii** Van Tiegh. Tree to 15 m.; brts. dark grayish brown: lvs. roundish-ovate to ovate, 5–12 cm. long, cuspidate, broad-cuneate at base, grayish green and sparingly pubescent beneath; petioles 2–5 cm. long: samaras 1–3-seeded. V.F.9. H.I.28:2787. C.C.130. (*E. Davidiana* Hemsl., not Baill.) C. China. Intr. 1896. Zone V.—Similar to the preceding.

The Himalayan **E. pleiospérma** Hook. & Thoms. (*E. Davidiana* Baill.) with the lvs. glaucescent beneath is apparently not in cult. C.C.131. It also occurs in W. China.

2. **TROCHODÉNDRON** Sieb. & Zucc. Evergreen tree; terminal bud large, pointed, with imbricate scales: lvs. alternate and clustered, long-petioled, crenate: fls. perfect, without perianth, in terminal, upright racemes; stamens numerous, spreading, with long filaments; carpels 5–10, in a whorl, inserted on a fleshy torus; stigmas short, linear, spreading; ovules many: fr. consisting of 5–10 follicles, partly immersed in the torus and dehiscent at the free apex; seeds linear, several in each follicle. (Greek, *trochos*, wheel, and *dendron*, tree; referring to the aspect of the spreading stamens.) One species in E. Asia.

T. aralioìdes Sieb. & Zucc. Tree to 20 m., with spreading brs., glabrous: lvs. rhombic-obovate to elliptic-lanceolate, 8–15 cm. long, obtusely acuminate, cuneate at base, crenate-serrate, dark lustrous green above, paler beneath, coriaceous; petioles 3–7 cm. long: fls. about 1.5 cm. across, bright green, on slender pedicels 1.5–3 cm. long, forming racemes 6–8 cm. long: fr. brown, 1.5–2 cm. across. Fl.VI; fr.X. B.M.7375(c). S.I.1:t.42(c). G.C.III.15:725. M.O.t.3. J.H.27:867(h). Japan, Korea. Cult. 1894. Zone VIII.—Handsome evergreen tree, usually a spreading shrub in cult.

25. CERCIDIPHYLLACEAE Van Tiegh. KATSURA-TREE FAMILY

Deciduous tree developing short spurs bearing the flowers and a solitary lf.; buds with 2 outer scales: lvs. opposite or subopposite on the shoots, solitary

on the spurs, petioled, palmately veined, crenate-serrate: fls. dioecious, developing from axillary buds or spurs before the lvs., with small bracts and without perianth (what is called fl. here is by some botanists considered to represent an infl.); staminate fls. nearly sessile with slender filaments and linear red anthers; pistillate fls. pedicelled, consisting of 3–5 carpels with long purple styles, their sutures extrorse, developing into dehiscent many-seeded pods; seeds small, winged, with copious endosperm and small embryo. One monotypic genus in E. Asia.

CERCIDIPHÝLLUM Sieb. & Zucc. KATSURA-TREE. Characters of the family. (*Cercis* and Greek *phyllon*, leaf; referring to the shape of the lvs.)

C. japónicum Sieb. & Zucc. Tree to 10, occasionally to 30 m., usually divided from the base into several stems, glabrous: lvs. suborbicular or broad-ovate, 5–10 cm. long, obtusish, cordate or subcordate at base, crenate-serrate, dark bluish green above, glaucescent beneath; petiole 2–3 cm. long: pods 1.5–2 cm. long. Fr.x. S.I.1:t.41(c). G.F.7:106, 107(h). Gn.88:373, 374(h). S.L.140(h). Japan. Intr. 1864 or 1865. Zone IV.—Var. **sinénse** Rehd. & Wils. Tree to 40 m., usually with a single trunk: lvs. somewhat hairy on the veins beneath; petiole about 2 cm. long: pods gradually narrowed at apex, 1–1.5 cm. long. C.C.135. C. and W. China. Intr. 1907. Zone (V).—Very desirable ornamental tree of rather dense pyramidal habit, with slender, ascending, later spreading brs. and with handsome foliage, purplish when unfolding, changing to bright yellow and partly scarlet in autumn. The Chinese variety is tenderer than the type.

26. RANUNCULACEAE Juss. BUTTERCUP FAMILY

Herbs or woody plants: lvs. alternate or opposite, often dissected: fls. perfect, rarely unisexual, regular or irregular; sepals 2–15, usually 5; petals 2–15 or wanting; stamens numerous, rarely few; carpels 1–many, usually separate; fr. an achene or follicle, rarely berry-like; seeds with endosperm and a minute embryo.—Forty-eight genera with nearly 1300 species, chiefly in the temp. regions in the n. hemisphere.

A. Lvs. alternate; sepals imbricate, 5–10: fr. a follicle.
  B. Fls. large, solitary or few, with 5 or more petals; stamens many.....1. *Paeonia*
  BB. Fls. small, in compound racemes; petals wanting; stamens 5–10.....2. *Zanthorhiza*
AA. Lvs. opposite; sepals valvate, usually 4: fr. an achene.....3. *Clematis*

1. PAEÒNIA L. PEONY. Herbs or deciduous shrubby plants; buds large, with few outer scales: lvs. large, alternate, pinnately dissected: fls. terminal, usually solitary, sometimes several, red, white or yellow; sepals 5, persistent; petals large, 5–10; stamens numerous; carpels 2–5, developing into dehiscent follicles, each with several large seeds. (Ancient Latin name.) About 35 species in Eu., Asia, and one in w. N. Am.

A. Lfts. not decurrent, the lower ones stalked: fls. white to red, 10–30 cm. across; carpels pubescent.....1. *P. suffruticosa*
AA. Lfts. decurrent; carpels glabrous.
  B. Fls. yellow, 5–10 cm. across.....2. *P. lutea*
  BB. Fls. dark crimson, about 5 cm. across.....3. *P. Delavayi*

1. P. suffruticòsa Andr. TREE P. Shrub to 2 m., with stout brs.: lvs. without the petiole 10–25 cm. long, bipinnate; lfts. broad-ovate to ovate-oblong, stalked or sessile, 3–5-lobed, rarely entire, glaucescent beneath and glabrous or sparingly pubescent; petioles 5–10 cm. long: fls. solitary, 10–30 cm. across, white rose or red: carpels densely pubescent, partly or nearly wholly enclosed by the disk. Fl.v–vi; fr.ix. Gn.52:325(h). M.G.11:201(h). S.L. 281(h). (*P. arborea* Donn, *P. moutan* Sims.) N. W. China, long cult. in China

and Japan. Intr. 1789. Zone V.—Var. **spontànea** Rehd. Stoloniferous: lfts. pubescent on the veins beneath, at least toward the base when young, broad-ovate to ovate: fls. 10–12 cm. across, white to pink, with 5–10 petals. N. China. Intr. 1910.—The following are the first garden forms intr.; their lfts. are narrower, usually oblong-ovate and quite glabrous.—Var. **papaveràcea** Bailey. Fls. nearly single, large, white, the petals thin and with a blotch of purple near base. A.R.7:463(c). B.M.2175(c). Gn.52:325,t(c). Intr. 1806. (*P. moutan p.* Anders.)—Var. **rôsea** Bailey. Fls. more or less double, sometimes nearly single, rose-colored. A.R.6:373(c). L.B.11:1035(c). (*P. moutan r. plena* and *r. semiplena* Anders.) Intr. 1794.—Var. **Bânksii** Bailey. Fls. more or less double; petals pale pink to nearly white at the margin, purplish toward the middle and base. A.R.7.448(c). B.M.1154(c). (*P. moutan B.* Anders.) Intr. 1789.—A cult. form which is probably nearest to the wild form and may be the same as var. *rubro-plena* Bailey is var. **Annéslei** Rehd. with almost single purple-pink fls. 10–12 cm. across. Trans. Hort. Soc.6:482,t(c). (*P. moutan A.* Sabine.) Orig. before 1826.—The Tree Peony with its numerous garden forms is one of the most gorgeous of all ornamental shrubs; they are of slow growth and prefer rich loamy soil.

2. **P. Delavaÿi** Franch. Subshrub to 1 m., stoloniferous, glabrous: lvs. bipinnatifid, the blade 15–25 cm. long, the segments ovate-lanceolate to lanceolate, 5–10 cm. long, decurrent at base, entire or with a few teeth, glaucous beneath; petioles 10–15 cm. long: fls. usually several, cup-shaped, 5–6 cm. across; petals 5–9, suborbicular to broad-elliptic, of firm texture; carpels included only at base by the disk, glabrous: follicles 2–2.5 cm. long. Fl.VI; fr.IX. G.C.III.68:93,97,98(fl,h). W. China. Intr. about 1908?—Var. **angustîloba** Rehd. & Wils. Lvs. more finely divided, with narrow-lanceolate or linear-lanceolate segments 5–10 mm. broad: petals broad-elliptic. G.C. III.53:403. W. China. Intr. 1908. Zone V.—The var. is a low shrub with much divided attractive lvs., but the fls. are not showy.

3. **P. lûtea** Franch. Subshrub to 1 m., glabrous: lvs. very similar to those of the preceding species: fls. usually solitary, 5–10 cm. across, golden-yellow; outer sepals leaf-like, the inner ones orbicular and yellowish green; petals 6–8, elliptic to obovate, concave, the outer ones irregularly crenate; anthers yellow; carpels 3, glabrous, inclosed only at base by the disk. Fl.VI; fr.IX. B.M.7788(c). R.H.1906:14,t(c). Gn.76:416. (*P. Delavayi* var. *l.* Franch.) China. Intr. 1886. Zone VI?—Var. **supérba** Lemoine. Lvs. bronzy red while young: fls. 8–12 cm. across, with 9–11 petals; filaments dark red. R.H.1906: 14,t(c). G.C.III.44,suppl.July,18. Intr. 1886.—A handsome peony particularly valuable on account of the yellow color of its fls.

P. l. × *suffruticosa* = **P. Lemoînei** Rehd. In habit and lvs. similar to *P. suffruticosa;* the form first raised is "L'Esperance" with single flowers, about 20 cm. across; petals 8–10, soft yellow, tinged red and buff particularly toward the base; filaments red, anthers yellow. "La Lorraine" is similar, but double. G.C.III.57:56, t(c).

2. **ZANTHORHÌZA** L'Hérit. YELLOW-ROOT. Deciduous low shrub; bark and root yellow and bitter; buds with few outer scales: lvs. alternate, clustered, long-stalked, pinnate or bipinnate: fls. polygamous, brownish purple, in terminal pendulous compound racemes; sepals 5; 5 small 2-lobed nectaries, sometimes called petals; stamens 5–10; carpels 10, 2-ovuled, developing into 1-seeded follicles. (Greek *xanthos*, yellow, and *rhiza*, root.) Syn.: *Xanthorrhiza* Marsh. One species in N. Am.

Z. apiifòlia L'Hérit. Stems sparingly branched, to 0.6 m.: lfts. usually 5,

ovate to ovate-oblong, 3–7 cm. long, incisely toothed, sometimes ternate; racemes 5–10 cm. long; fls. 4 mm. across; sepals ovate, acute. Fl.IV–V. B.M.1736(c). G.O.t.129(c). S.L.377(h). N. Y. to Ky. and Fla. Intr. 1776. Zone IV.

3. **CLÈMATIS** L. VIRGIN'S BOWER. Perennial herbaceous, or suffruticose or woody plants, often climbing; winter-buds with several pairs of outer scales: lvs. opposite, usually compound,[1] rarely simple: fls. solitary or in panicles or cymes, perfect, rarely dioecious, apetalous; sepals usually 4, rarely 5–8, valvate in bud, rarely imbricate, petaloid; sometimes petaloid staminodes present; stamens numerous; carpels many, developing into 1-seeded achenes with a persistent, usually long and plumose style. (Greek name of a slender vine.) Including *Viorna* Reichenb., *Viticella* Dill. and *Atragene* L. About 230 species, widely distributed through the temp. regions chiefly of the n. hemisphere.

A. Sepals more or less upright forming a tubular, urceolate or campanulate fl.; stamens appressed, usually pubescent; fls. usually blue, violet, purple or red, rarely yellowish or whitish.
  B. Fls. without petaloid staminodes.
    C. Lfts. or lvs. entire, sometimes lobed; fls. solitary; stamens including the connective densely pubescent.
      D. Lvs. simple, sessile.....1. *C. integrifolia*
    DD. Lvs. pinnate.
      E. Style of fr. glabrous or silky.
        F. Lfts. not reticulate, the terminal one usually present.....2. *C. crispa*
        FF. Lfts. reticulate beneath, the terminal one usually replaced by a tendril. 3. *C. Simsii*
      EE. Style of fr. plumose.
        F. Pedicels much longer than the fls.
          G. Sepals pubescent outside.
            H. Lfts. reticulate, subcoriaceous.....4. *C. reticulata*
            HH. Lfts. indistinctly veined, membranous.....5. *C. Viorna*
          GG. Sepals glabrous outside.
            H. Fls. purplish.....6. *C. divaricata*
            HH. Fls. scarlet.....7. *C. texensis*
        FF. Pedicels of axillary fls. shorter than sepals.....8. *C. fusca*
  CC. Lfts. or lvs. serrate or toothed: stamens pubescent or glabrous.
    D. Lvs. compound: fls. on the young growth.
      E. Plant upright, subshrubby: fls. in axillary clusters: lvs. ternate; stamens glabrous or nearly so.....9. *C. heracleifolia*
      EE. Plants climbing, woody: lvs. pinnate or bipinnate: stamens pubescent.
        F. Fls. in axillary long-stalked panicles, yellowish.
          G. Lvs. simply pinnate.
            H. Lfts. glabrous or nearly so; sepals pubescent inside.....10. *C. connata*
            HH. Lfts. silky beneath; sepals glabrous inside.....11. *C. Rehderiana*
          GG. Lvs. bipinnate.....12. *C. Veitchiana*
        FF. Fls. 1–3 in the axils.
          G. Sepals glabrous outside, tinged violet-purple: lfts. serrate..13. *C. lasiandra*
          GG. Sepals slightly pubescent outside, whitish: lfts. small, deeply lobed or dissected.....14. *C. aethusifolia*
    DD. Lvs. simple: fls. axillary on last year's brs.: stamens glabrous.....15. *C. cirrhosa*
  BB. Fls. with petaloid staminodes, solitary; stamens densely pubescent.
    C. Lvs. ternate.....16. *C. verticillata*
    CC. Lvs. biternate.....17. *C. alpina*
AA. Sepals spreading (somewhat campanulate in Nos. 40–43); stamens divergent.
  B. Stamens glabrous (or only with few hairs below the anther or near base; hairy in No. 31).
    C. Fls. solitary or in fascicles from axillary buds on last year's brs.
      D. Lfts. or lvs. entire or occasionally lobed: fls. solitary, blue, violet, red or white.
        E. Style glabrous; sepals obovate, usually 4.
          F. Fls. 2–5 cm. across; filaments shorter than anthers: lvs. bipinnate. 18. *C. Viticella*
          FF. Fls. 8–14 cm. across: lvs. pinnate.....19. *C. Jackmani*
        EE. Style pubescent; sepals 6 or more, elliptic or ovate, large; filaments as long or longer than anthers.
          F. Pedicels longer than sepals: lvs. glabrous or slightly pubescent beneath.
            G. Style of fr. silky; fl.-stalk with 2 bracts.....20. *C. florida*
            GG. Style of fr. plumose; fl.-stalk without bracts.....21. *C. patens*

[1]The term flammuliform has been used in this genus for pinnate lvs. with all or part of the lfts. 3-foliolate, and biflammuliform, if the lvs. are bipinnate.

FF. Pedicels shorter than sepals: lvs. woolly beneath, simple or ternate. 22. *C. lanuginosa*
DD. Lfts. serrate: fls. white or rarely pink, fascicled, from the axils of last year's brs. (sometimes on the young growth in No. 24).
E. Lvs. ternate.
F. Lvs. glabrous or sparingly pubescent....23. *C. montana*
FF. Lvs. silky beneath: fls. sometimes on the young growth....24. *C. chrysocoma*
EE. Lvs. pinnate; lfts. about 1.5 cm. long....25. *C. gracilifolia*
CC. Fls. in axillary or terminal panicles, rarely reduced to 3-fld. cymes, sometimes solitary in No. 33, on the young growth except in No. 26; sepals white, rarely pinkish (bluish in No. 31).
D. Lfts. entire or nearly so or occasionally 3-lobed.
E. Lvs. 3-foliolate; lfts. always entire.
F. Fls. from scaly buds on last year's brs.: lfts. ovate, coriaceous. 26. *C. Armandi*
FF. Fls. from the young growth: lfts. lanceolate, subcoriaceous. 27. *C. Pavoliniana*
EE. Lvs. pinnate or bipinnate.
F. Fls. white: climbing shrubs.
G. Lvs. pinnate.
H. Lfts. 9–11, silky beneath....28. *C. Delavayi*
HH. Lfts. 3–5, glabrous beneath....29. *C. paniculata*
GG. Lvs. bipinnate....30. *C. Flammula*
FF. Fls. bluish: upright plant....31. *C. aromatica*
DD. Lfts. or lvs. serrate or dentate, only occasionally nearly entire.
E. Lvs. simple, serrate to pinnatifid: habit upright....32. *C. songarica*
EE. Lvs. compound: habit climbing (except in No. 38).
F. Lvs. ternate or biternate.
G. Fls. perfect: lfts. ovate to ovate-lanceolate, sparingly incised-dentate. 34. *C. apiifolia*
GG. Fls. dioecious: lfts. usually ovate, coarsely dentate....35. *C. virginiana*
FF. Lvs. pinnate or bipinnate.
G. Fls. white: high climbing shrubs.
H. Fls. 1–3, axillary: lvs. bipinnate....33. *C. Fargesii*
HH. Fls. in panicles or cymes: lvs. pinnate.
I. Sepals pubescent inside: lfts. glabrous or nearly so.
J. Fls. dioecious: lfts. firm, usually 1–2.5 cm. broad. 36. *C. ligusticifolia*
JJ. Fls. perfect: lfts. thin, usually 3–4.5 cm. broad....37. *C. Vitalba*
II. Sepals glabrous inside: lfts. pubescent beneath....39. *C. grata*
GG. Fls. bluish white: plant subshrubby, to 2 m. tall....38. *C. Jouiniana*
BB. Stamens with pubescent filaments; fls. yellow or yellowish: lvs. glabrous.
C. Lfts. usually entire or lobed, bluish or grayish green: fls. 2–4 cm. across, usually several.
D. Sepals pubescent inside: lfts. often oblong or lanceolate....40. *C. orientalis*
DD. Sepals glabrous inside: lfts. usually ovate or oval....41. *C. glauca*
CC. Lfts. serrate: fls. 5–8 cm. across, usually solitary, long-stalked.
D. Lvs. pinnate; lfts. dentate with spreading teeth....42. *C. tangutica*
DD. Lvs. biternate; lfts. serrate with the teeth pointing forward....43. *C. serratifolia*

Sect. I. VIORNA Reichenb. Sepals more or less upright, with narrow margin or broad only above the middle; stamens upright, usually pubescent.

Group 1. CRISPAE Prantl. Lvs. or lfts. entire: fls. solitary, sometimes 2 or 3; stamens pubescent including the connective.

1. **C. integrifòlia** L. Herbaceous or subshrubby, upright, to 1 m.: lvs. sessile, ovate to oblong-ovate, 6–10 cm. long, acute, entire, slightly pubescent beneath or nearly glabrous, green on both sides, thin: fls. terminal, solitary, slender-stalked, 3–4 cm. long, violet or blue to white; sepals above the middle with broad margin and spreading, glabrous outside: frs. with plumose style. Fl. VI–VII. B.M.65(c). R.I.4:t.60,f.4663(c). Fl. VI–VIII. S. E. Eu. to W. Asia and Altai. Cult. 1573. Zone V.—An upright plant, more herbaceous than suffruticose with rather coarse foliage and conspicuous usually blue flowers.

C. i. × *Viorna* = *C. divaricata;* see No. 6.—*C. i.* × *Jackmani* = *C. Durandi;* see under No. 19.—*C. i.* × *Viticella* = *C. eriostemon;* see under No. 18.—*C. i.* × *Flammula* = *C. aromatica;* see No. 31.

2. **C. crispa** L. Shrubby climber, to 3 m. high: lfts. 3–7, ovate to ovate-lanceolate, 4–8 cm. long, sometimes lobed, thin, glabrous: fls. solitary, long-stalked, nodding, bell-shaped, 2–4 cm. long, fragrant, bluish purple; sepals tubulose below, above the middle with a broad wavy margin and spreading, glabrous or nearly so outside: achenes with silky, not plumose styles. Fl. VI–IX. B.M.1160(c,1892(c.) I.H.t.2:t.78(c, as *C. campaniflora*). Gn.34:

147,t(c). (*C. cylindrica* Sims, *Viorna c.* Small.) Va. to Fla. and Tex. Intr. 1726. Zone V.—A slender vine with large and handsome fragrant fls.

C. c. × *texensis;* see under No. 7.

3. **C. Símsii** Sweet. High climbing vine; brts. pubescent: lfts. 3–6 or 7, usually ovate, 3–7 cm. long, entire or deeply 2–3-lobed, occasionally ternate, acute or obtusish and mucronulate, reticulate and somewhat pubescent beneath, the terminal one often changed into a tendril: fls. solitary, long-stalked, urn-shaped, 2–2.5 cm. long, purplish; sepals with recurved and margined tip, pubescent outside: achenes with glabrous or silky styles. Fl. VI–IX. B.M.1816(c, as *C. cordata*). Lavallée, Clemat. t.15. (*C. Pitcheri* Torr. & Gray, *Viorna S.* Small.) S. Ind. to Neb. and Tex. Intr. before 1810. Zone V.—Var. **Sargéntii** Rehd. Fls. smaller and paler: lfts. rarely lobed. Lavallée, Clemat. t.18. (*C. S.* Lav.)—Not very showy and like the preceding lacking the feathery frs., an ornamental feature of most species.

C. S. × *texensis;* see under No. 7.

4. **C. reticulàta** Walt. Woody vine to 3 m. high or more: lfts. 3–7, broad-ovate or elliptic to ovate-lanceolate, 3–7 cm. long, obtuse or acute, strongly reticulate and glabrous or pubescent beneath, subcoriaceous: fls. nodding, urn-shaped, about 2 cm. long; sepals with recurved tips, dull yellowish and grayish pubescent outside, pale violet inside: achenes with long plumose styles. Fl.VII. B.M.6574(c). Lavallée, Clemat. t.16. (*Viorna r.* Small.) S. C. to Tex. and Fla. Intr. before 1884. Zone VI?

5. **C. Viórna** L. Slender woody vine to 3 m.: lfts. 5–7, ovate to ovate-oblong, 3–8 cm. long, obtuse or acute, cuneate to subcordate at base, entire or lobed and sometimes 3-foliolate, glabrous or nearly so, deep green: fls. nodding, urn-shaped, 2.5–3 cm. long, dull reddish purple; sepals thick, pubescent outside, with recurved tips: achenes with brownish plumose styles. Fl. V–VIII. Lavallée, Clemat. t.17. Gn.54:240. (*Viorna V.* Small.) Pa. and Ohio to Ga. and Ala. Intr. 1730. Zone V.

6.×**C. divaricàta** Jacq. (?*C. integrifolia*×*Viorna.*) Upright bushy sub-shrubby plant: lvs. pinnate or simple and deeply and irregularly lobed; lfts. 3–7, sessile and often decurrent, acute or obtusish, glabrous or nearly so beneath: fls. nodding, rather short-stalked, campanulate, about 2.5 cm. long, purplish; sepals spreading and margined above the middle, pubescent or glabrous outside: styles plumose. Fl.VI–VII. Jacquin, Eclog. Pl. Rar. t.13(c). G.W.14:562(h),563. (*C. integrifolia pinnata* Hort.) Orig. before 1805.

7. **C. texénsis** Buckl. Suffruticose vine to 2 m.: lfts. 4–8, the terminal one usually replaced by a tendril, broad-ovate, 3–8 cm. long, usually obtuse, subcordate at base, sometimes lobed, glaucous, subcoriaceous: fls. solitary, slender-stalked, urn-shaped, much narrowed at the mouth, 2–3 cm. long, carmine or scarlet; sepals thick, glabrous outside, with slightly spreading tips: achenes with long plumose styles. Fl.VII–IX. B.M.6594(c). Gt.32: 86,t.(c). Gn.19:284,t.(c). R.H.1888:348,t.(c). (*C. coccinea* Engelm., *Viorna c.* Small.) Tex. Intr. before 1868 or 1878. Zone VI?—A handsome vine with bright scarlet fls.—Var. **màjor** Rehd. Fls. to 3.5 cm. long. (*C. coccinea* var. *m.* Bean.)

C. t. × *Jackmani* = **C. pseudococcínea** Schneid.; here belongs "Countess of Onslow" (G.C.III.16:9. Gn.52:304,t.f1(c);57:376[h]), "Countess of York" (Gn.52:304,t.f.2[c]) and "Countess of Albany" (Gn.52:304,t.f.3[c]).—There are also hybrids with *C. crispa* (see Gn.49:189. M.G.13:500) and with *C. Simsii* (see R.H.1893:376,t[c]).

8. **C. fúsca** Turcz. Suffruticose vine to 4 m.: young brts. pubescent: lfts. 5–7, the terminal one often wanting, ovate to ovate-oblong, 3–6 cm. long,

acute, rounded or subcordate at base, glabrous or pubescent beneath: fls. nodding on villous pedicels shorter or as long as the sepals, urn-shaped, 2–2.5 cm. long; sepals thick, with recurved tips, densely brownish pubescent outside, violet inside: achenes with fulvous plumose styles. Fl. VI–VIII. Lavallée, Clemat. t.20. S. N. E. Asia. Intr. about 1860. Zone IV.—Var. **violàcea** Maxim. Fls. slightly pubescent and violet outside. Gt.13:t.455(c). Manch. Intr. about 1860.—Interesting and very hardy, but not particularly showy plant.

Into this group or possibly to the Connatae belongs **C. Prâttii** Hemsl. Woody vine to 3 m., glabrous: lfts. 3, ovate-oblong, 2–3.5 cm. long, entire, glaucous beneath: fls. solitary, axillary, slender-stalked, tubular, 2 cm. long, bright yellow; styles plumose. W. China. Intr. 1908. Zone VI?—Very distinct and graceful vine with yellow fls.

Group 2. TUBULOSAE Decne. Upright herbs, often woody at base: lvs. ternate; lfts. serrate: fls. tubular, in axillary fascicles or in spikes, white to blue; stamens glabrous or nearly so.

9. **C. heracleifòlia** DC. Upright plant, woody at base, to 1 m.: lfts. 3, broad-ovate, 6–15 cm. long, truncate or broad-cuneate at base, coarsely dentate and often slightly lobed, with mucronate teeth, slightly pubescent: fls. polygamous, in axillary clusters, tubular, 2–2.5 cm. long, blue and pubescent outside; sepals reflexed at apex: achenes with plumose styles. Fl. VIII–IX. B.M.4269(c), 6801(c). F.S.3:t.195(c). (*C. tubulosa* Turcz.) E. China. Intr. 1837. Zone V.—Var. **Davidiàna** Hemsl. Slenderer and taller: lfts. usually cuneate: fls. dioecious, indigo-blue, fragrant; the sepals tubular only at base, spreading above, not curling back. R.H.1867:90(c). Gn.49:99;68: 273. (*C. D.* Decne.) N. China. Intr. 1868.—Var. **ichangénsis** Rehd. & Wils. Lfts. usually rounded at base sparingly pubescent above, more densely beneath: fls. densely silky outside; sepals curled back at apex, deep blue inside: achenes densely villous. C. and N. China. Intr. 1908.—This species is a rather coarse plant with upright stout stems and clustered lighter or deeper blue fls. in size and shape similar to hyacinths; var. *Davidiana* is the more showy in bloom.

C. h. × *Vitalba* = *C. Jouiniana;* see No. 38.

The closely related **C. stans** Sieb. & Zucc. with whitish or bluish white flowers from Japan is scarcely woody. (B.M.6810.)

Group 3. CONNATAE Koehne. Shrubby climbers: lvs. pinnate or bipinnate; lfts. serrate: fls. in axillary panicles, rarely 1–3, campanulate, usually whitish or yellowish; sepals not or only at the tips recurved; stamens pubescent.

10. **C. connàta** DC. Vigorous climber to 8 m.; brts. glabrous or nearly so: lvs. pinnate; lfts. 3–7, ovate to ovate-oblong, 5–12 cm. long, long-acuminate, cordate at base, coarsely, but rather regularly toothed with rounded mucronulate teeth, not or very slightly lobed on one side, rarely 3-lobed, glabrous or slightly pubescent; petioles enlarged at base and surrounding the stem: fls. in slender-stalked panicles 8–12 cm. long and with large leafy bracts, nodding, campanulate, 2–2.5 cm. long, pale yellow; sepals pubescent on both sides, recurved at apex; filaments densely, connective slightly pubescent: achenes with long plumose styles. Fl. VIII–X. Himal., S. W. China. Intr. before 1887. Zone VI?

A closely related species is **C. trullífera** Finet & Gagnep. Lfts. 7–9, ovate, 4–10 cm. long, cordate or rounded at base, coarsely and incisely serrate, often 3-lobed, glabrous or nearly so; petioles much enlarged at base and united forming a flat or cup-like expansion 1–2.5 cm. wide, bloomy: fls. in rather short-pedunded panicles with small subulate bracts; filaments and connective densely pubescent. W. China. Intr. 1903. Zone VI?

11. **C. Rehderiàna** Craib. Woody climber, up to 8 m.; brts. pubescent: lvs. pinnate; lfts. 7–9, broad-ovate, 4–8 cm. long, acuminate, usually cordate

at base, coarsely toothed, often 3-lobed, sparingly appressed-pubescent above, silky beneath and conspicuously veined: fls. nodding, fragrant, campanulate, about 1.5 cm. long, pale yellow or yellowish white, in many-fld. short panicles on upright stalks 8–12 cm. long; bracts at base of the panicle ovate to lanceolate, 1–2 cm. long, often 3-lobed; sepals narrow-oblong, downy outside, nearly glabrous within; filaments and connective pubescent: achenes with plumose styles. Fl.VIII–X. G.C.III.48:310. Gn.75:557(as *C. nutans*). R.H. 1905:438(as *C. Buchananiana vitifolia*). (*C. nutans* var. *thyrsoidea* Rehd. & Wils., *C. nutans* Bean, not Royle.) W. China. Intr. 1898. Zone VI?—Vigorous climber with rather large lvs. and fragrant late appearing fls.

12. **C. Veitchiàna** Craib. Slender woody vine: lvs. bipinnate; pinnae 7–9, mostly 3-foliolate or sometimes 3-lobed; lfts. ovate to ovate-lanceolate, 2.5–6 cm., rounded or broad-cuneate at base, coarsely dentate or often 3-lobed, sparingly pubescent above, silky beneath: fls. nodding, fragrant, campanulate, 1.5 cm. long, in panicles on upright stalks 6–10 cm. long; bracts of the infl. lanceolate or subulate, scarcely 1 cm. long: otherwise like the preceding species. Fl.IX–X. W. China. Intr. 1904. Zone VI?—Similar to the preceding species, but slenderer and with more finely divided foliage.

13. **C. lasiándra** Maxim. Woody climber to 4 m.; young growth viscid: lvs. bipinnate; pinnae 3–7, mostly 3-foliolate or 3-lobed, only the upper ones often simple; lfts. ovate to ovate-lanceolate, 3–8 cm. long, long-acuminate, sharply serrate, glabrous or sparingly pubescent, bright green; petioles enlarged at base and connate: fls. axillary, 1–3, on slender stalks 3–7 cm. long, campanulate, 1.5–2 cm. long, whitish and more or less suffused with dull violet; sepals with recurved tips, glabrous or nearly so outside; stamens about as long as sepals, densely pubescent: achenes with plumose styles. Fl.VIII–X. C. and W. China. Intr. 1900. Zone V.—Graceful vine with late appearing rather dull colored and small fls.

A related species is **C. acutángula** Hook. f. & Thoms. Large woody climber; stems sharply angled: lvs. bipinnate; pinnae 5–7, the lower ones 3-foliolate: lfts. ovate to ovate-lanceolate, 3–7 cm. long, coarsely toothed and often 3-lobed: fls. in axillary, short-stalked cymes on slender pedicels; sepals slightly pubescent outside and each with 3 longitudinal membranous wings on back. Fl.IX–X. Himal., W. China. Intr. about 1906. Zone VII?—The only other species known to have winged sepals are *C. chiisanensis* (see under No. 16) and *C. pterantha* Dunn, not yet intr.; both easily distinguished by the 3-foliolate lvs.

14. **C. aethusifòlia** Turcz. Slender woody climber to 2 m.: lvs. pinnate or bipinnate; pinnae 5–9, the lower ones usually pinnate; lfts. small, 5–15 mm. long, deeply dissected into obovate-oblong or linear-oblong, acute or obtusish lobes, bright green, glabrous: fls. 1–3 on axillary slender stalks with a leaf-like bract above the middle, campanulate, about 1.5 cm. long, pale yellow; sepals narrow-oblong, not or little reflexed at apex, minutely pubescent outside: achenes with long plumose styles. S.H.1:f.186b[1](l). Fl.VIII–IX. N. China, Manch. Intr. 1910. Zone V.—Var. **latisécta** Maxim. Lvs. usually simply pinnate; lfts. to 3.5 cm. long, often 3-fid or deeply lobed and toothed with broad, ovate or obovate lobes. B.M.6542(c). Gt.10:t.342. R.H.1869: 10. Gn.45:241. Manch. Intr. 1855. Zone IV.—Slender much-branched vine with graceful foliage, particularly delicate in the typical form, flowering profusely in autumn.

Group 4. CIRRHOSAE Prantl. Woody climbers: lvs. simple or ternate, serrate: fls. from axillary buds on last year's brs., nodding, campanulate, with an involucre below the sepals; stamens glabrous.

15. **C. cirrhòsa** L. Climbing to 3 m., glabrous: lvs. persistent, simple, ovate to ovate-oblong, 2–4 cm. long, obtuse or acute, rounded or subcordate

at base, coarsely crenate-serrate, sometimes 3-lobed: fls. 1–2, axillary, broadly campanulate, 3–5 cm. across, yellowish white; sepals broad-elliptic, 2–2.5 cm. long, downy outside; pedicels 1.5–3 cm. long, below the fl. with 2 bracts connate into a cup-shaped involucre: achenes with long plumose styles. Fl.IV–V. B.M.1070(c). L.B.19,t.1806(c). R.H.1924:186,t(c). S. Eu., Asia Minor. Intr. 1596. Zone VII or VIII.—Desirable on account of its early fls.

The closely related **C. baleàrica** Rich. (*C. calycina* Ait.) with ternate lvs. and greenish yellow fls. is tenderer and probably not hardy within our area.

Group 5. ATRAGENAE Prantl. Lvs. ternate to biternate: fls. from axillary buds of last year's brs., solitary, nodding, campanulate, with petaloid staminodes; stamens pubescent.

16. **C. verticillàris** DC. Trailing or climbing to 3 m.: lvs. 3-foliolate; lfts. slender-stalked, ovate to oblong-ovate, 3–8 cm. long, acuminate, rounded or subcordate at base, entire or coarsely toothed, slightly pubescent on the veins beneath: fls. purple or bluish purple, on slender stalks 2–7 cm. long; sepals 4 thin, oblong-lanceolate, 3–4 cm. long, slightly downy outside, strongly veined: staminodes and stamens about half as long as sepals: achenes with long plumose styles. Fl.V–VI. B.M.887(c). B.B.2:126. (*Atragene americana* Sims.) Hudson Bay to B. C., s. to Va. and Utah. Intr. 1797. Zone II?—Handsome vine with showy fls. in spring; rare in cult.; prefers apparently shady and moist situations.

Related species are: **C. koreàna** Komar. Prostrate; lfts. 3, acuminate, 4–8 cm. long, coarsely dentate, the lateral ones ovate, truncate to subcordate at base, sometimes 3-lobed to 3-parted, the terminal one 3-lobed to 3-parted, sparingly pilose on veins beneath and sometimes on the face: fls. yellow to dull violet; sepals elliptic to elliptic-lanceolate, 2.5–3.5 cm. long; staminodes spatulate, ½ to ⅔ as long as sepals. Act. Hort. Petrop. 22:t.6. Korea. Cult. 1920. Zone V.—**C. chiisanénsis** Nakai. Similar to the preceding: lfts. nearly glabrous: sepals with 3 longitudinal winged keels on back, yellowish. M.I.2:t.107. Korea. Intr. 1917. Zone V.—Var. **carunculôsa** Rehd. Lfts. hairy above, glabrous beneath: fls. yellow, sometimes flushed red; sepals outside at base with small bract-like appendages forming a kind of involucre. R.H.1915:534. M.O.19. (*C. alpina* var. *c.* Gagnep.) Korea. Intr. 1908.

17. **C. alpìna** Mill. Woody climber to 2 m.: lvs. biternate or occasionally simply ternate: lfts. short-stalked or nearly sessile, ovate to ovate-lanceolate, 2–5 cm. long, acute, coarsely serrate, slightly pubescent beneath: fls. on slender stalks 4–12 cm. long, campanulate, violet-blue; sepals narrow-oblong, 3–4 cm. long, minutely downy outside; staminodes spatulate, about half as long as the sepals: achenes with plumose styles. Fl.IV–V. B.M.530(c). R.I.4:t.60,f.4662(c). H.W.3:16. G.W.10:82(h). (*Atragene a.* L.) C. and S. Eu. to N. E. Asia. Intr. 1792. Zone V.—Var. **sibírica** Ktze. Fls. yellowish white. B.M.1951(c). L.B.14:1358(c). R.H.1855:321,t.(c). (Var. *alba* Hort., *Atragene s.* L.) Siberia. Intr. 1753. Zone V.—Handsome vine with early showy fls.

Closely related species are: **C. pseudoalpìna** A. Nels. Lfts. usually more or less lobed and incisely toothed with few large teeth or lobes, glabrous beneath: staminodes narrower and fewer usually with a rudimentary anther at apex. S.H.1:f. 186c(l). (*Atragene p.* Rydb., *C. alpina* var. *occidentalis* Gray.) Colo. to N. Mex. and Utah. Intr. 1916. Zone VI.—**C. macropétala** Ledeb. Lfts. incisely toothed and often lobed: fls. violet, 4–5 cm. long; staminodes narrow-lanceolate, acuminate, nearly as long as the sepals, longer than stamens. G.C.III.77:254. Gn.86:106(fl); 87:227(h);88:223(h). N. China, Siber. Intr. 1910. Zone V. Has the largest fls. of any species of this group.

Sect. II. VITICELLA Link. Shrubby climbers: lvs. simple to bipinnate with entire or somewhat lobed lfts.: fls. 1–3, axillary or terminal, large; sepals spreading, 4–8, with broad margin folded in in bud; stamens glabrous or with a few hairs below the anthers.

18. **C. Viticélla** L. Slender woody climber to 4 m.: lvs. usually bipinnate,

sometimes pinnate; pinnae **5–7**, the lower ones usually 3-foliolate; lfts. ovate to ovate-lanceolate, 1.5–5 cm. long, usually obtuse, rounded at base, sometimes elliptic and acute at ends, entire to 3-lobed, glabrous or nearly so: fls. 1–3, slender-stalked, 3–5 cm. across, purple, rosy-purple or violet; sepals 4, spreading, obovate; filaments as long or shorter than anthers, usually with a few hairs below the anther: achenes large, nearly glabrous except at apex; style short, glabrous. Fl.VI–VIII. B.M.565(c). R.I.4:t.65(c). H.W.3:15. Lavallée, Clemat. t.7. S. Eu. to W. Asia. Intr. 1597. Zone V.—Var. **albiflòra** Ktze. Fls. white. (Var. *alba* Hort., not Carr.)—Var. **purpúrea** Loud. Fls. reddish purple. (Var. *rubra* Bean.)—Var. **kermesìna** Lem. Fls. bright wine-red.—Var. **coerùlea** Loud. Fls. blue-violet.—Var. **multiplex** G. Don. Fls. double, violet-blue. (Var. *fl. pleno*, Hort., var. *pulchella* Jaeg.)—Var. **nàna** Carr. Dwarf form about 1 m. high, bushy.—A graceful woody climber flowering profusely in summer.

Several hybrids of this species are known of which *C. V.* × *lanuginosa* = *C. Jackmani* (see No. 19) is the most important. Other hybrids are the following: *C. V.* × *integrifolia* = **C. eriostèmon** Decne. Sarmentose subshrub, to 3 m.; upper lvs. often simple, lower ones pinnate, the lowest pair of pinnae usually short-stalked; lfts. similar to those of *C. Viticella*: fls. slender-stalked, broad-campanulate, 4–6 cm. across, blue; filaments pubescent except at base: achenes slightly downy; style plumose below the middle, glabrous above. R.H.1852:341,t(c); 1856:341(c, as *C. divaricata*). M.O.23. Lavallée, Clemat.t.10,12. (*C. Hendersonii* Hort., *C. cylindrica* var. *Hendersonii* K. Koch, *C. Chandleri* Hort., *C. Bergeronii* Hort., *C. intermedia* Hort.) Origin. about 1830.—*C. V.* × *florida* = **C. venòsa** Schneid. Climbing shrub, similar to *C. Viticella*: lvs. bipinnate; lfts. ovate, acute, sparingly hairy beneath: fls. large, with 4–6 purple obovate sepals; styles glabrous. F.S.13:t.1364(c). R.H.1860:183(c). Lavallée, Clemat.t.6. (*C. Viticella* var. *v.* Carr., *C. florida* var. *v.* Lav.) Origin before 1860.—*C. V.* × *patens* = **C. Guáscoi** Lem. Woody climber; young brts. pubescent: lfts. usually 5, nearly glabrous: fls. solitary, about 8 cm. across, violet-purple, with 4–6 obovate sepals, strongly 3-nerved, tomentose outside; style pubescent. I.H.4:t.117(c). B.H.7:226,t(c). Lavallée, Clemat.t.7bis. (*C. francofurtensis* Lav.) Orig. before 1857.—*C. V.* × *Flammula* = *C. violacea;* see under No. 31.

A closely related species is **C. campaniflòra** Brot. Woody climber to 6 m.; lvs. bipinnate; pinnae 5–9: lfts. ovate to ovate-lanceolate, 2–6 cm. long, acute, entire or sometimes lobed: fls. nodding on pubescent stalks 3–7 cm. long, broad-campanulate, 1.5–2.5 cm. across, white, tinged with violet; filaments broad, shorter than anthers, with a few hairs below the anthers: achenes with short appressed-pubescent style. Fl.VII–VIII. L.B.10:987(c). Gn.31:187,t.(c). Lavallée, Clemat.t.8. Portugal. Intr. 1810. Zone V or VI.

19. × **C. Jackmâni** Th. Moore (*C. lanuginosa* × *Viticella*). Woody climber to 3 m.: lvs. pinnate, the upper ones often simple; lfts. ovate, rather large, usually slightly pubescent beneath: fls. usually 3, slender-stalked, 10–14 cm. across, usually violet-purple; sepals usually 4, sometimes 6, obovate; filaments often shorter than anthers, sometimes pubescent below the anther; styles glabrous or sometimes plumose up to the middle. Fl.VII–X. I.H.11:t.414(c). F.S.16:t.1629(c). R.H.1868:390(c). Gn.71:507(h). (*C. splendida* Simon-Louis.) Orig. about 1860. Zone V or VI.—One of the most important groups of large-flowered Clematis of which numerous forms are in cult., one of the best known being "Mme. André" (R.H.1893:180,t.[c]).—*C. Jackmani* has been united by Lavallée with the doubtful *C. hakonensis* Franch. & Sav. and considered a species of Japanese origin.

C. J. × *integrifolia* = **C. Durândi** Ktze. Suffruticose climber to 3 m.: lvs. simple, ovate, 8–12 cm. long, acute, broadly cuneate to subcordate at base, nearly glabrous; petioles 2–5 cm. long: fls. slender-stalked, 8–12 cm. across, dark violet-blue; sepals spreading and recurving, usually 4, rarely more, obovate, with wavy margin; stamens yellow: achenes with plumose styles. Fl.VI–IX. Gn.49:98,t(c). G.W.17:108,t.f.2(c). (*C. integrifolia D.* Hort., *C. integrifolia semperflorens* Hort.) Orig. before 1874.

20. **C. flòrida** Thunb. Deciduous or half-evergreen woody climber, to 4 m.: lvs. usually biternate, sometimes ternate; lfts. ovate to ovate-lanceolate, 2–5 cm. long, acute, entire or sometimes with 1 or 2 lobes or with a few teeth, dark green above, slightly pubescent or nearly glabrous beneath: fls. axillary, solitary, on slender pubescent stalks 6–12 cm. long, with 2 entire or lobed leafy bracts near the middle, 5–8 cm. across; sepals spreading, 4–6, ovate, acute, creamy-white with a green band on back; stamens purple, glabrous; styles silky or glabrous above, not plumose in fruit. Fl.VI–VII. B.M.834(c). R.H.1856:41,t(c). Lavallée, Clemat.,t.5. G.C.III.32:51. (*C. japonica* Makino, not Thunb.) C. China; cult. in Japan. Intr. from Japan in 1776. Zone VI or VII?—Var. **Siebóldii** Sweet. Stamens partly changed into purple staminodes. B.R.24:25(c). Gn.22:142,t.(c);87:340(h). R.N.1915: 552,t(c). (Var. *bicolor* Lindl., *C. S.* D. Don.) Intr. 1837.—Var. **plèna** Sweet. Fls. double, the stamens being changed into greenish white sepals shorter than the outer whorl of sepals. Jacquin, Pl. Hort. Schoenbrunn. 3:t.357(c). Intr. before 1798.

C. f. × *Viticella* = *C. venosa;* see under No. 18.

21. **C. pàtens** Morren. Deciduous woody climber to 4 m.: lvs. ternate or pinnate; lfts. 3–5, ovate to ovate-lanceolate, 4–10 cm. long, acute or acuminate, usually rounded at base, entire, slightly pubescent beneath: fls. solitary and terminal on axillary brts. with one pair of long-stalked ternate lvs., 10–15 cm. across, white to violet or violet-blue; sepals 6–8, elliptic to oblong-elliptic, narrowed into a claw at base, not or slightly overlapping; style appressed-pubescent near apex, plumose below. Fl.V–VI. B.R.23:1955(c). P.M.4:t.193(c). Lavallée, Clemat. t.2. (*C. coerulea* Lindl.) Japan. Intr. 1836. Zone VI?—Var. **grandiflòra** Rehd. Fls. larger than in the type. B.M. 3983(c). (*C. coerulea* var. *g.* Hook.)—Var. **Standíshii** Rehd. Lfts. 3, small: fls. 12–14 cm. across; sepals light lilac-blue, of metallic lustre. (*C. S.* Hort., *C. florida* var. *S.* Th. Moore.) By some considered *C. florida* × *patens.*—Var. **Fortùnei** Rehd. Fls. 8–12 cm. across, on a stout stalk with a whorl of simple or ternate long-stalked lvs. below the fl.: sepals very numerous, rather narrow, creamy white becoming pink; style appressed-pubescent above the middle, plumose below. F.S.15:t.1553(c). G.C.1863:676. (*C. F.* Th. Moore, *C. florida* var. *F.* Davis.) Intr. about 1860.—This and the preceding species represent groups of the large-flowered Clematis valuable for their early flowering habit, while *C. lanuginosa* and *C. Jackmani* bloom in summer and autumn.

C. p. × *Viticella* = *C. Guascoi;* see under No. 18.—*C. p.* × *lanuginosa* = *C. Lawsoniana;* see under No. 22.

22. **C. lanuginòsa** Lindl. Woody climber, not more than 2 m. tall: lvs. ternate or simple, ovate to ovate-lanceolate, 6–12 cm. long, acuminate, rounded or subcordate at base, entire, glabrous above, pubescent beneath, of firm texture: fls. terminal, 1–3 on woolly bractless stout stalks usually shorter than the sepals, white to pale lilac, 10–20 cm. across; sepals 6–8, ovate or elliptic, overlapping, woolly outside; styles long-plumose. Fl.VII–IX. F.S. 8:t.811(c). I.H.1:t.14(c). G.C.III.29:23. Lavallée, Clemat. t.1. China. Intr. about 1850. Zone VI.

From this species most of our large-flowered summer-blooming Clematis have been derived and one of the most important groups of hybrids is that classed under *C. l.* × *Viticella* = *C. Jackmani;* see No. 19.—Another important group is *C. l.* × *patens* = **C. Lawsoniàna** Anderson-Henry. The typical form is said to be a cross of *C. patens Fortunei* and *C. lanuginosa.* Lvs. usually ternate: fls. large, on long stalks; sepals 6–8, usually elliptic and overlapping, rosy-purple and dark-veined in the typical form; styles plumose. Here belong also var. **Symesi-**

àna Rehd. (*C. S.* Anderson-Henry); var. **Hénryi** Rehd. (*C. H.* Anderson-Henry, not Hemsl.) G.M.43:318. B.C.2:795; var. **Gablénzii** Rehd. (*C. patens G.* Hort.) G.Z.14:80,t(c), and many other garden forms. This group of hybrids resembles in many respects *C. Jackmani* which, however, may be distinguished by the usually 4 or sometimes 6, obovate or rhombic sepals, by the styles being glabrous above the middle, and by the fls. appearing usually in 3's.

Sect. III. FLAMMULA DC. Upright herbs to climbing shrubs: lvs. simple to bipinnate: fls. white, pink or yellow sepals valvate, usually with narrow margin; stamens spreading, glabrous or pubescent at base, without nectaries.

Group 1. MONTANAE Schneid. Woody climbers: lvs. ternate or pinnate, with serrate lfts.: fls. rather large, white, sometimes pink, from axillary scaly buds of last year's branches; sepals with broad margin, folded in in bud; stamens glabrous.

23. **C. montàna** Buch.-Ham. Woody climber to 8 m.: lfts. 3, short-stalked, ovate to ovate-oblong, 3–10 cm. long, acute, incisely toothed, occasionally entire, glabrous or nearly so: fls. 1–5, fascicled, on slender stalks 5–10 cm. long, white, usually 3.5–5 cm. across; sepals elliptic-oblong, slightly pubescent outside; stamens yellow; achenes glabrous, with plumose styles. Fl.v. R.H.1856:161,t.(c);1899:529(h). G.C.III.20:589(h). Gn.60:79(h);75:371(h);86:111(h). (*C. anemoniflora* D. Don.) Himal., C. and W. China. Intr. 1831. Zone VI.—Var. **grandiflòra** Hook. Fls. 5–8 cm. across. B.M. 4061(c). M.G.17:423(h).—Var. **rubens** Ktze. Lvs. purplish, particularly when unfolding; fls. rosy-red to pinkish, 5–6 cm. across. R.H.1909:35.t(c). Gn.77:84(h);87:339, 632(h). B.S.1:364(h). Intr. 1900.—Var. **lilácina** Lemoine. Fls. bluish lilac. G.34:345.—Var. **Wilsònii** Sprague. Lfts. ovate, usually rounded at base, puberulous on the veins beneath: fls. 6–8 cm. across, white; sepals obovate-oblong, pubescent outside. Fl.VI–VII. B.M.8365(c). Gn.82:287. M.G.27:26(h).—This species is one of the most beautiful of the early blooming Clematises, particularly var. *rubens*.

C. m. × *chrysocoma* = **C. vedrariénsis** Vilm. Similar to *C. montana*: fls. 5–6 cm. across, mauve-pink or rose-colored; sepals broad-elliptic. G.C.III.55:393(h);61:94. (*C. verrieriensis* Gard. Chron.) Orig. before 1912.—Var. **rósea** Rehd. Fls. light rose-colored, 8–10 cm. across. R.H.1922:214,t(c). (*C. Spooneri* var. *rosea* Vilm.) Orig. 1817.

24. **C. chrysócoma** Franch. Upright and shrubby or climbing to 6 m.; young brts., peduncles and leaves on both sides with dense yellow appressed pubescence: lfts. 3, short-stalked, ovate to elliptic or obovate, 2–5 cm. long, acute or obtuse, rounded or broad-cuneate at base, 3-lobed or coarsely toothed: fls. fascicled, 1–5 from axillary scaly buds, sometimes 3–5 on a peduncle 4–12 cm. long, or terminal and axillary on the young growth, white, tinged pink, 4–5 cm. across; sepals elliptic, densely silky outside, glabrous inside: achenes pubescent with plumose styles. Fl.VI–IX. B.M.8395(c). M.O.21. W. China. Intr. about 1890. Zone VII or VIII.—Var. **serícea** Schneid. Fls. 1 or 2 from axillary buds, not on the young growth, 7–9 cm. across, white; sepals broad-obovate. Fl.VI–VII. M.O.27. (*C. montana* var. *s.* Franch., *C. Spooneri* Rehd. & Wils.) W. China. Intr. 1909. Zone VII?—The typical form is often shrubby and continues to bloom from the new growth through August and September, while the variety which has larger and showier fls. only blooms from the old wood.

C. c. × *montana* = *C. verrierensis;* see under No. 23.

25. **C. gracilifòlia** Rehd. & Wils. Woody climber to 4 m.: lfts. pinnate; lfts. short-stalked or subsessile, 5–7, ovate to oblong-ovate, 1–2 cm. long, acute, rounded to cuneate at base, with few coarse teeth or 3-lobed, sparingly pubescent: fls. 1–4, fascicled, from axillary buds, on slender pubescent stalks 3–5 cm. long, white, 3–4 cm. across; sepals obovate to oblong-obovate, slightly pubescent outside: achenes glabrous with long-plumose styles. Fl.VI.

W. China. Intr. 1910. Zone V or VI.—Graceful floriferous climber similar to *C. montana* but slenderer and with smaller more finely divided foliage.

Group 2. Rectae Prantl. Upright herbaceous plants or woody climbers: lvs. simple to bipinnate; lfts. entire or serrate: fls. white, rarely pink, on the young growth in terminal and axillary panicles, rarely in axillary 3-fld. cymes occasionally reduced to 1 fl. or axillary on last year's brs.; sepals with narrow margin, rarely broad above the middle: anthers usually several times longer than broad and longer than the filaments.

26. **C. Armándi** Franch. Evergreen woody climber, to 5 m.: lfts. 3, on twisted stalks 1–3 cm. long, oblong-ovate to lanceolate, 8–12 cm. long, acuminate, rounded or subcordate at base and 3-nerved, entire, quite glabrous, lustrous above, coriaceous: fls. in leafless panicles from axillary buds on last year's brs., white, 3–6 cm. across; sepals 4(–6), oblong to oblong-obovate: achenes sparingly hairy with long plumose styles. Fl.v. B.M.8587(c). G.C.III.38:30. R.H.1913:65. Gn.81:519(h);87:631. C. and W. China. Intr. 1900. Zone VII or VIII.—Var. **Farquhariàna** Rehd. & Wils. Fls. light pink, 5–7 cm. across, sepals often 5 or 6. M.O.18. R.H.1921:276. (Var. *grandiflora* Mottet.)—Handsome evergreen climber with showy white fls. in spring.

C. A. × *Pavoliniana* = **C. Jeuneiàna** Symons-Jeune. Similar to *C. Armandi*, but infl. larger and looser. G.C.III.69:135.

A related species is **C. fasciculiflòra** Franch. Evergreen climber to 6 m.; lfts. 3, ovate to ovate-oblong, 4–12 cm. long: fls. in dense axillary fascicles on short woolly stalks 1–2 cm. long, creamy-white, densely woolly outside; anthers much shorter than filaments: achenes quite glabrous. S. W. China. Intr. about ? 1910. Zone VIII?

27. **C. Pavoliniàna** Pampan. Subevergreen climber, to 4 m.: glabrous: lfts. 3, on twisted stalks, oblong-ovate to lanceolate, 5–10 cm. long, acuminate, subcordate or rounded at base, 3-nerved, entire, thinly coriaceous: infl. an axillary 3-fld. cyme or a few-fld. raceme with small lanceolate bracts; pedicels 2–4 cm. long: fls. about 3 cm. across; sepals lanceolate, nearly glabrous, white, greenish outside; outer filaments as long or longer than anthers: achenes pilose; style plumose, fulvous. Fl. vi. B.M.8655(c). E. to W. China. Intr. 1908. Zone VII or VIII.—A subevergreen climber with not particularly showy fls.

C. P. × *Armandi* = *C. Jeuneiana;* see under No. 26.

The following more or less closely related species have been intr., but are probably all tenderer: **C. quinquefoliolàta** Hutchins. Young brts., infl. and lvs. sparingly pubescent: lvs. pinnate, with 5 lanceolate lfts.: cymes 3–9-fld., leafy; filaments several times longer than anthers. V.F.3. (*C. Meyeniana* var. *heterophylla* Gagnep.) C. China. Intr. 1899.—**C. chinénsis** Retz. Lvs. pinnate; lfts. usually 5, ovate to oblong-lanceolate, 2–6 cm. long, rounded at base, slightly pubescent when young: fls. 1.5–2 cm. across, in many-fld. axillary leafless panicles; filaments longer than anthers. Retzius, Observ.2:t.2. C. China to Indochina. Intr. 1900.—**C. Meyeniàna** Walp. Lfts. 3, ovate to ovate-oblong, 5–12 cm. long, usually cordate at base, glabrous: fls. 2–2.5 cm. across, in many-fld. panicles with small subulate bracts: achenes hairy; styles plumose. B.R.599(c). B.M.7897(c). Japan, S. E. China, Indochina. Cult. 1821.—**C. uncinàta** Champ. Lvs. bipinnate or sometimes pinnate; pinnae usually 5, the lower ones 3-foliolate: lfts. ovate to ovate-lanceolate, 4–10 cm. long, glabrous, glaucescent beneath: fls. about 2.5 cm. across, white, fragrant, in many-fld. leafless panicles: achenes oblong-lanceolate, glabrous; style plumose. H.I.1533. (*C. leiocarpa* Oliv.) C. China. Intr. 1901.—A form with emarginate lfts. and leafy infl. is var. **retùsa** Sprague. B.M.8633(c). Cult. 1915.

28. **C. Delavaÿi** Franch. Upright shrub to 1.5 m.: lvs. pinnate, 3–10 cm. long; lfts. 7–11, subsessile, ovate to oblong-ovate, 8–20 mm. long, acute, rounded at base, dark green above, densely silky and silvery-white beneath: fls. white, 2–3 cm. across, in terminal 3- to several-fld. cymes, on slender silky pedicels 2–5 cm. long; sepals 4–6, obovate-oblong, rounded at apex,

with broad margin, densely silky outside; filaments longer than anthers: achenes pubescent; styles plumose. Fl.VII–VIII. M.O.22. W. China. Intr. 1908. Zone VI?—A very distinct species, resembling more a white-flowered Potentilla than a Clematis: will probably grow best in a rockery of southern aspect in limestone soil.

29. **C. paniculàta** Thunb. Vigorous woody climber to 10 m.: lvs. ternate or pinnate; lfts. 3–5, ovate, 3–10 cm. long, acute, subcordate or rounded at base, entire or sometimes lobed, glabrous: fls. about 3 cm. across, white, fragrant, in many-fld. panicles; sepals oblong, nearly glabrous outside; filaments longer than anthers: achenes margined, thinly appressed-pubescent; styles plumose. Fl.IX–X. G.F.3:621;5:91(h);9:75,185(h). R.H.1902:86. Gn. 57:155. M.G.1898:487–9(h). (*C. recta* var. *p.* Ktze., *C. Flammula robusta* Carr.) Japan. Intr. 1864? Zone V.—A very desirable and quick growing climber with white fragrant fls. profusely produced in autumn.—Var. **dioscoreaefòlia** Rehd. Lfts. generally ovate and cordate, usually rounded and mucronate at apex, in the floral region often emarginate of thickish texture; sepals broader, obovate-oblong to oblong. (*C. d.* Lév. & Vaniot.) Korea. Intr. 1911.

30. **C. Flámmula** L. Woody climber to 5 m.: lvs. usually bipinnate, sometimes pinnate; pinnae usually 5, the lower ones usually 3-foliolate or 2–3-lobed; lfts. broad-ovate to narrow-lanceolate, 1.5–4 cm. long, acute or sometimes obtuse, usually rounded or cuneate at base, often lobed, but otherwise entire, bright green, glabrous: fls. white, fragrant, 2–3 cm. across, in large many-fld. panicles; stamens white; anthers shorter than filaments: achenes minutely appressed-pubescent; styles plumose. Fl.VIII–X. R.I.4:t.63(c). H.W.3:14. Gn.58:319(h);76:23(h). (*C. Pallasii* J. F. Gmelin.) Mediterr. Reg. to Persia. Cult. 1590. Zone VI.—Var. **rotundifòlia** DC. Lfts. broader. obtuse. R.I.4:t.62,f.4666(c). (*C. fragrans* Ten.) Mediterr. Reg. Zone VII?—A desirable climber with profuse fragrant white flowers in autumn.

C. F. × *Viticella* = **C. violàcea** DC. Climbing shrub to 4 m.: lvs. bipinnate or pinnate; lfts. entire: fls. about 3 cm. across, pale violet, in terminal panicles; sepals often 6; style pubescent. Ann. Soc. Bot. Gand.1:t.45(c). Orig. before 1840. Zone VI or V?—Var. **rubro-marginàta** Rehd. Sepals 4, white, with reddish violet margin. (*C. Flammula rubro-marginata* Cripps, *C. r.* Jouin.) Orig. before 1883.—*C. F.* × *integrifolia* = *C. aromatica;* see No. 31.

31. × **C. aromática** Lenné & Koch (*C. Flammula* × *integrifolia*). Upright or sarmentose subshrub to 2 m.: lvs. pinnate; lfts. 3–7, short-stalked, ovate to elliptic, 3–6 cm. long, acute, rounded to broad-cuneate at base, entire, glabrous: fls. 3–4 cm. across, bluish violet, fragrant, on slender stalks about 5 cm. long, in loose terminal cymes; sepals oblong, spreading and reflexed; stamens with a few hairs below the anthers: achenes pubescent; styles plumose. Fl.VII–IX. (*C. coerulea* var. *odorata* Hort., *C. davurica* K. Koch, not Patrin.) Lavallée, Clemat. t.9. R.H.1877:15. Origin. before 1850.—A handsome plant for the herbaceous border.

32. **C. songàrica** Bge. Upright shrub to 1.5 m., in cult. often sarmentose and suffruticose: lvs. simple, lanceolate to linear-lanceolate, 3–8 cm. long, acute, attenuate at base, serrate with spreading teeth or occasionally pinnatifid near base, sometimes entire, glaucous or grayish green, glabrous; petioles 8–20 mm. long: fls. yellowish white, 2–2.5 cm. across, on slender pedicels 2–4 cm. long, in terminal cymes; anthers very narrow, longer than the filaments: achenes pubescent; styles plumose, glabrous toward the apex. Fl. VIII–IX. S.H.1:f.183x–x^3,186d. (*C. Gebleriana* Bong.) Siber. to Turkest. Intr. before 1880. Zone V.—Distinct and peculiar species, but not very

ornamental and rarely cult. The var. **integrifòlia** Ledeb. with entire lvs. is apparently not in cult.

33. **C. Fargèsii** Franch. Woody climber to 6 m.: lvs. bipinnate; pinnae 5–7, the lower ones 3-foliolate; lfts. ovate, 2–5 cm. long, acute, usually rounded or truncate at base, irregularly incisely serrate and lobed, sparingly silky-pubescent: fls. 3.5–5 cm. across, pure white, in 3-fld. cymes or solitary, on slender pedicels with the peduncle 7–18 cm. long; sepals usually 6, obovate, rounded and mucronate at apex, outside tinged yellowish and slightly pubescent; anthers shorter than filaments: achenes glabrous; styles plumose. Fl. VI–IX. Gn.89:659(h). W. China. Intr. 1911. Zone V.—Var. **Soùliei** Finet & Gagnep. Lfts. usually narrower, sometimes broad-cuneate at base, nearly glabrous: fls. 5–7 cm. across, often solitary. B.M.8702(c). W. China. Intr. 1911.—A handsome vine with large pure white flowers.

34. **C. apiifòlia** DC. Woody climber to 3 m.: lvs. ternate, or occasionally biternate; lfts. ovate to ovate-lanceolate, 4–7 cm. long, acuminate, rounded or broad-cuneate at base, coarsely toothed and often lobed, pubescent on the veins beneath or nearly glabrous: fls. dull white, 1.5–2 cm. across, in axillary panicles with the peduncle 5–12 cm. long; anthers oblong: achenes pubescent, 5–8 in small fruiting heads with the rather short plumose styles about 3 cm. across. Fl.IX–X. S.H.1:f.183z–z^4,186e. Japan. Intr. about 1863. Zone V.—Var. **obtusidentàta** Rehd. & Wils. Lfts. broader and larger, coarsely toothed, with large rounded teeth, pubescent beneath: infl. larger. C. China. Intr. 1907.—Handsome vine, though not as showy as some allied species; valuable for its late flowering time.

A closely related species is **C. Pierôtii** Miq. Lvs. mostly biternate; lfts. ovate to ovate-lanceolate: infl. usually cymose, few- to many-fld.; achenes glabrous except the ciliate margin. G.F.5:139(as *C. brevicaudata*). Japan. Cult. 1890. Zone V.

Group 3. VITALBAE Prantl. Similar to the preceding group: woody climbers: lvs. always compound: fls. perfect or dioecious, small, white; anthers elliptic-oblong, not more than twice as long as broad, several times longer than the filaments.

35. **C. virginiàna** L. Climbing to 6 m.: lvs. ternate, rarely pinnate with 5 lfts.; lfts. ovate, 5–9 cm. long, acuminate, rounded or subcordate at base, coarsely toothed, nearly glabrous: fls. dioecious, dull white, 2–3 cm. across, in axillary leafy panicles; sepals obovate-oblong to spatulate, pubescent outside; anthers elliptic: achenes pubescent, in large fruiting heads with the plumose heads about 5 cm. across. Fl.VIII–IX. B.B.2:122. Gd.W.t.12(c). N. S. to Man., s. to Ga. and Kans. Intr. 1767. Zone IV.

A closely related species is **C. missouriénsis** Rydb. Lfts. usually 5, ovate or broad-ovate, 5-9 cm. long, appressed-pubescent beneath. Neb. to Mo. Intr.?

36. **C. ligusticifòlia** Nutt. Climbing to 6 m.: lvs. pinnate; lfts. 5–7, ovate to lanceolate, 3–7 cm. long, acuminate, truncate to cuneate at base, coarsely toothed and often 3-lobed, sparingly strigose or glabrous, yellowish or bright green, of thickish texture: fls. dioecious, white, about 2 cm. across, in terminal and axillary cymes: achenes densely pubescent, with plumose styles, in large heads. Fl.VIII–IX. B.B.2:122. Jour. Intern. Gard. Club,3:229(h). B. C. and N. D. to N. Mex. and Calif. Cult. 1880. Zone V.

37. **C. Vitálba** L. TRAVELERS' JOY. Climbing to 10 m.: lvs. pinnate; lfts. usually 5, the lowest pair occasionally 3-foliolate, ovate to ovate-lanceolate, 3–10 cm. long, acute or acuminate, rounded or subcordate at base, coarsely toothed or sometimes entire, occasionally 3-lobed, slightly pubescent or nearly glabrous, thin: petiolules 1–3 cm. long: fls. about 2 cm. across, white, faintly fragrant, in axillary and terminal panicles; sepals densely

pubescent outside: achenes pubescent, with long plumose styles, in large heads. Fl.VII–IX. R.I.4:t.64,f.4667(c). H.W.3:13. M.G.1898:319(h). Eu., N. Afr., Cauc. Long cult. Zone IV.—A handsome strong growing vine, profusely blooming in summer.

A closely related species is **C. Gouriàna** Roxb. Lfts. 5–7, ovate to ovate-oblong, 3–8 cm. long, long-acuminate, usually subcordate at base, often entire, glabrous or pubescent, chartaceous; petiolules 5–10 mm. long: fls. 1.5–2 cm. across. Wight, Icon.t.933–4. (*C. Vitalba* var. *G.* Ktze.) Himal., China. Intr. 1901. Zone VI? —Var. **Finétii** Rehd. & Wils. Lvs. glabrous: achenes glabrous. C. & W. China. Intr. 1907.—Another related species is **C. brevicaudàta** DC. Lvs. bipinnate; pinnae 5–7, the lower 3-foliolate, occasionally only 3-lobed; lfts. ovate to ovate-oblong, 3–7 cm. long, coarsely toothed or sometimes entire, glabrous or pubescent: fls. 1.5–2 cm. across, nearly glabrous outside, on long and slender pedicels in axillary loose cymes; sepals elliptic: achenes in small heads with the rather short plumose styles about 3 cm. across. Manch. to W. China. Has been confused with *C. apiifolia* and *C. Pierotii* and doubtful if in cult.

38. × **C. Jouiniàna** Schneid. (*C. heracleifolia* × *Vitalba*). Subshrubby climber, to 3 or 4 m.: lvs. ternate or pinnate; lfts. 3–5, ovate, 5–10 cm. long, acuminate, rounded or truncate at base, coarsely toothed, slightly pubescent: fls. white at first, finally suffused with lilac, 2.5–3 cm. across, in terminal and axillary cymes forming a large terminal panicle; sepals spreading, linear-oblong, pubescent outside; anthers shorter than the filaments. Fls.VIII–X. B.S.1:362. S.H.1:280,f.185l–l[4]. Gn.66:365;71:506(h, as *C. grata*). Orig. before 1900.—A handsome vigorous climber blooming profusely in autumn.

39. **C. grâta** Wall. Vigorous climber: young brts. pubescent: lvs. pinnate; lfts. usually 5, the lowest pair sometimes 3-foliolate, broad-ovate, 3–6 cm. long, acute or acuminate, truncate or subcordate at base, coarsely and incisely toothed, pubescent on both sides or glabrous above: fls. white, about 2 cm. across, on pedicels 1–2 cm. long, in terminal and axillary rather dense, pubescent panicles or cymes; sepals oblong, densely pubescent outside, glabrous inside; buds obovoid, obtuse; filaments longer than anthers: achenes pubescent, with long plumose styles. Fl.IX–X. Wallich, Pl. As. Rar. 1,t.98(c). (*C. Vitalba* var. *g.* Ktze.) Himal. Intr.?—Var. **lobulàta** Rehd. & Wils. Lfts. with coarser and fewer teeth, often 3-lobed or 3-fid, densely pubescent on both sides. C. and W. China. Intr. 1907. Zone VI?—Var. **grandidentàta** Rehd. and Wils. Lfts. occasionally only 3, larger, 5–9 cm. long, with few large teeth, glabrescent above. C. and W. China. Intr. 1907.—A vigorous climber similar to *C. Vitalba*.

Group 3. ORIENTALES Prantl. Woody climbers: lvs. biternate or pinnate to bipinnate: fls. yellow, solitary or few; filaments pubescent, longer than the linear-oblong anthers; achenes pubescent, with long plumose styles.

40. **C. orientàlis** L. Slender woody climber to 6 m.: lvs. pinnate or bipinnate, the lower pinnae usually 3-foliolate, sometimes 5-foliolate, or 3-fid; lfts. ovate to oblong-ovate or lanceolate, 1.5–5 cm. long, lobed or coarsely toothed, glabrous or minutely pubescent: fls. yellow, 3–5 cm. across, solitary or few on slender stalks 4–10 cm. long; sepals elliptic to oblong-elliptic, pointed, spreading and finally somewhat reflexed, pubescent inside and usually outside: achenes pubescent with long plumose styles. Fl.VIII–IX. B.M.4495(c). Lavallée, Clemat. t.21. R.H.1855:321,t(c);1899:530. Gn.45: 240,t(c);52:501(h). (*C. crux-flava* Cock., *C. graveolens* Lindl.) Persia to Himal.; escaped in N. Mex. Intr. 1731. Zone VI?—Handsome slender climber with glaucescent finely divided lvs. and profuse yellow fls. in autumn.

41. **C. glaûca** Willd. Slender woody climber, glabrous: lvs. pinnate to bipinnate; lfts. elliptic to lanceolate, 1.5–5 cm. long, 2–3-lobed, otherwise entire, very glaucous: fls. yellow, 3.5–5 cm. across, solitary or few on slender

pedicels 3–8 cm. long; sepals elliptic to elliptic-oblong, pointed, glabrous on both sides, open-campanulate at first, finally spreading, not recurving: achenes pubescent, with long plumose styles. Fl.VIII–IX. Willdenow, Berl. Baumz. t.4,f.1. R.H.1890:561. (*C. orientalis* var. *g.* Maxim.) W. China to Siber. Cult. 1752. Zone V.—Var. **akebioïdes** Rehd. & Wils. Lfts. ovate to ovate-lanceolate, 2–3-lobed and irregularly crenately toothed: fls. bronzy-yellow. W. China. Intr. 1904.—Var. **phaeántha** Rehd. A form of the preceding var. with the fls. dull violet outside. Cult. 1918.—Var. **angustifòlia** Ledeb. Lfts. narrow-oblong to linear-oblong, or 2–3-lobed with narrow lobes. (*C. intricata* Bge.) Siber., N. China. Intr. 1905.—Handsome climber similar to *C. orientalis*, but hardier.

42. **C. tangùtica** Korsh. Woody climber to 3 m.: young brts. usually slightly villous: lvs. pinnate or bipinnate; lfts. oblong-lanceolate to lanceolate, 3–8 cm. long, serrate with spreading teeth, sometimes deeply 2–3-lobed, glabrous, bright green: fls. large, bright yellow, usually solitary on slightly pubescent stalks 8–15 cm. long; sepals ovate-lanceolate, 3–5 cm. long, long-acuminate, glabrous on both sides, open-campanulate at first, finally spreading: fruiting head with the plumose styles about 6 cm. across. Fl.VI, and usually again in autumn. B.M.7710(c). R.H.1902:528,t(c). G.W.14:651(h). (*C. orientalis* var. *t.* Maxim., *C. eriopoda* Koehne, not Maxim.) Mong. to N. W. China. Cult. 1890. Zone V.—Var. **obtusiúscula** Rehd. & Wils. Lfts. smaller: sepals elliptic to elliptic-ovate, obtusish to short-acuminate, 2.5–3 cm. long. J.L.47:193. N. W. China. Intr. 1910.—Ornamental vine, the handsomest of the yellow-flowered clematises; also the large heads of feathery fruits are very attractive; the variety is less handsome.

43. **C. serratifòlia** Rehd. Woody climber to 3 m.: lvs. biternate; lfts. ovate-lanceolate to lanceolate, 3–6 cm. long, acuminate, serrate with the teeth pointing forward, and sometimes 2–3-lobed, glabrous, bright green: fls. 1–3, yellow, large, on slender stalks 4–6 cm. long; sepals ovate-lanceolate to oblong, 2–2.5 cm. long, acuminate, glabrous outside, slightly villous inside, open-campanulate at first, later spreading; filaments purple, much longer than the oblong anthers; head of frs. with the plumose styles about 6 cm. across. Fl.VIII–IX. Korea. Cult. 1909. Zone V.—Handsome climber similar to *C. tangutica*, with smaller fls., but blooming in autumn and more profusely.

27. LARDIZABALACEAE Lindl. LARDIZABALA FAMILY

Woody plants, mostly twining: lvs. alternate, compound, estipulate: fls. polygamous or unisexual, regular, in racemes, rarely solitary: sepals 6, rarely 3, petaloid; petals wanting, but nectaries often present; stamens 6; carpels 3 to many, superior, free, with numerous ovules arranged in longitudinal rows, rarely only one ovule; carpels baccate in fr., dehiscent or indehiscent; seed with copious endosperm and a small straight embryo.—Eight genera with about 20 species in E. Asia, Himal. and Chile.

A. Lvs. pinnate: upright shrub ..... 1. *Decaisnea*
AA. Lvs. digitate: twining shrubs.
B. Lfts. 3–9, subequal and all distinctly stalked.
C. Lvs. evergreen; lfts. acute or acuminate; sepals 6 ..... 2. *Holboellia*
CC. Lvs. deciduous; lfts. emarginate; sepals 3 ..... 3. *Akebia*
BB. Lfts. 3, the terminal one generally obovate, cuneate at base, the lateral ones of different shape and subsessile or short-stalked.
C. Lateral lfts. with a straight midrib, penninerved; carpels 3, many-seeded. 4. *Sinofranchetia*
CC. Lateral lfts. 2 or 3-nerved at base, with forking nerves: carpels many, 1-seeded. 5. *Sargentodoxa*

1. **DECAÏSNEA** Hook. & Thoms. Upright shrub with stout sparingly branched stems: winter-buds large, ovoid, with 2 outer glabrous scales: lvs. odd-pinnate; lfts. opposite, entire: fls. polygamous, in elongated racemes forming panicles terminal on lateral brts.; pedicels slender; sepals 6, lanceolate, long-acuminate, petaloid; nectaries wanting; stamens 6, in the staminate fls. with long filaments connate into a column, short and nearly distinct in the pistillate fl.; pistils 3, free, developing into oblong fleshy follicles dehiscent along the ventral suture and with numerous seeds in 2 rows imbedded in a white pulp. (After Joseph Decaisne, French botanist; 1809–1882.) Two species in the Himal. and W. China.

D. Fargèsii Franch. Shrub to 5 m., glabrous: lvs. 50–80 cm. long; lfts. 13–25, short-petioled, ovate to ovate-oblong, 6–14 cm. long, acuminate, broad-cuneate or rounded at base, glaucous beneath: panicle drooping, 25–50 cm. long; pedicels about 1 cm. long; fls. pendulous, campanulate, greenish, 2.5–3 cm. long: fruiting carpels cylindric, curved, 5–10 cm. long and about 2 cm. thick, blue, bloomy; seeds ovoid, flattened, about 1 cm. long, black. Fl. VI; fr. X. B.M.7848(c). R.H.1900:270, 271, 273. G.C.III.73:161. G.W. 17:533(h),534(fr). W. China. Intr. 1893. Zone V or VI.—Handsome shrub with stout stems and large pinnate lvs.; its fls. are inconspicuous, but the large blue fruits are attractive; they are insipid, but eaten by the Chinese.

2. **HOLBOÈLLIA** Wall. Evergreen twining shrubs, glabrous: lvs. long-petioled, digitate; lfts. 3–9, entire, stalked: fls. monoecious, in few-fld. axillary racemes; sepals 6, petaloid, obtusish, fleshy; nectaries 6, small; staminate fls. with 6 free stamens and a rudimentary ovary; pistillate fls. with small staminodes and 3 carpels developing into indehiscent fleshy pods with numerous black seeds in several rows. (After F. L. Holboell, once superintendent of the Botanic Garden at Copenhagen.) Five species in China and Himal.

H. grandiflòra Réaubourg. Climbing to 6 m.: lfts. 3–7, oblong to oblanceolate, 6–14 cm. long, acuminate, usually cuneate at base (rounded and ovate to oblong-elliptic in young cult. plants), dark green above, glaucous and reticulate beneath; petiolules 1–4 cm. long: fls. campanulate, 2–3 cm. long, white, fragrant; pedicels 2.5–3 cm. long; staminate fls. with oblong-obovate, obtuse outer sepals, in the pistillate fls. broad-elliptic and acutish, the inner sepals narrower: fr. purple, 8–12 cm. long, edible. Fl. V. W. China. Intr. 1908. Zone VIII?—Handsome evergreen climber valuable chiefly for its delightfully fragrant white fls., the largest in the genus.

The following species are in cult., but probably tenderer, though *H. Fargesii* may be as hardy: **H. Fargèsii** Réaubourg. Lfts. 5–9, oblong-lanceolate to oblanceolate, 5–12 cm. long, glaucous below, with inconspicuous veins: fls. 1.5–2 cm. long, the pistillate purplish, the staminate greenish white. H.I.29:2848. (*Stauntonia longipes* Hemsl.) C. China. Intr. 1907.—**H. latifòlia** Wall. Lfts. 3–7, ovate-oblong to oblong, 5–12 cm. long, green and reticulate beneath: fls. about 1.5 cm. long, in short racemes, colored like those of the preceding species. B.R.32;t.49(c). R.H.1890:348,t(c). Gn.14:369. (*Stauntonia* l. Wall.) Himal. Intr. 1840.—**H. coriàcea** Diels. Lfts. 3, ovate or elliptic to oblong, 5–8 cm. long; pale green below with the veinlets invisible: fls. about 1 cm. long, on slender pedicels, the staminate white, the pistillate purple. G.C.III.71:270(h);77:391(h). C. China. Intr. 1907.

Of the closely related genus **Stauntònia** DC. which differs chiefly in the connate stamens and the thinner, acuminate sepals, only **S. hexaphýlla** Decne. is in cult. Lvs. similar to those of *H. latifolia;* lfts. 3–7, ovate to elliptic, 6–10 cm. long, reticulate and pale green beneath, coriaceous: fls. 1.5–2 cm. long, white, tinged with violet. S.Z.1:t.76(c). G.C.II.5:597. A.G.12:139. Japan, Korea. Intr. 1876. Zone VIII?

3. **AKÈBIA** Decne. Deciduous or half-evergreen twining shrubs, glabrous: buds with many imbricate glabrous scales: lvs. long-petioled, digitate; lfts. 3–5, stalked, emarginate at apex: fls. monoecious, in axillary racemes, the pistillate at the base, the staminate ones smaller, at the end of the raceme; sepals 3; stamens 6, with subsessile anthers; carpels 3–12, developing into ovoid-oblong fleshy pods opening along the ventral suture, with numerous black seed in several rows. (Akebi, its Japanese name.) Two species in eastern Asia.

A. Lfts. 5, entire.....1. *A. quinata*
AA. Lfts. 3, sinuately toothed or entire.....2. *A. lobata*

1. **A. quinàta** Decne. Climbing to 10 m. or more, glabrous: lfts. 5, obovate or elliptic to oblong-obovate, 3–6 cm. long, emarginate, rounded or broad-cuneate at base, glaucous beneath: fls. slender-stalked, fragrant, the pistillate purplish brown, 2.5–3 cm. across, with broad-elliptic sepals, the staminate rosy purple, much smaller, on pedicels 5 mm. long: fr. 6–8 cm. long, purple-violet, bloomy. Fl. v; fr. IX–X. B.M.4864(c). G.F.4:137(fr). Gn.51:151. G.W.10:500(h);13:437. H.B.1:157(h). C. China to Japan and Korea. Intr. 1845.—A graceful vine with fragrant dark colored fls. in spring; the showy fruits are but rarely produced with us.

2. **A. lobàta** Decne. Climbing to 6 m. or more: lfts. 3, broad-ovate to ovate, 3–7 cm. long, emarginate, usually rounded or truncate at base, undulate or sinuately dentate, sometimes entire, glaucescent or greenish beneath: pistillate fls. maroon-red, 2–2.5 cm. across, the staminate smaller, numerous, pale purple, on pedicels 1–3 mm. long: fr. 6–8 cm. long, pale purple, edible. Fl. v. B.M.7485(c). S.Z.1:t.78(c). A.G.1891:140. G.W.13:438. C. China to Japan. Intr. before 1890. Zone V.—Var. **austrâlis** Diels. Lfts. ovate to ovate-oblong, entire or nearly so, subcoriaceous: pistillate fls. to 3 cm. across. C. and W. China. Intr. 1907. Probably tenderer.—Similar to the preceding species, but apparently not quite as handsome.

4. **SINOFRANCHÉTIA** Hemsl. Deciduous twining shrub: terminal buds large, with about 9 imbricate mucronate glabrous outer scales: lvs. long-stalked, 3-foliolate; the lateral lfts. short-stalked, oblique: fls. unisexual, probably dioecious, short-pedicelled, in long, bractless racemes; sepals 6, obovate; nectaries 6; stamens (or staminodes in the pistillate fl.) free, 6; carpels 3, developing into subglobose many-seeded berries; seeds ovoid, compressed. (After Adrien Franchet, French botanist, who described many new Chinese plants; 1834–1900.) Monotypic.

S. chinênsis Hemsl. Climbing to 10 m., glabrous: lfts. 3, large, short-acuminate, dark green above, glaucescent beneath with yellowish veins and darker veinlets, subchartaceous, the terminal one rhombic-obovate to broad-obovate, cuneate at base, on a stalk 2–3 cm. long; the lateral ones very oblique at base and nearly rounded, obliquely ovate, 7–11 cm. long, on stalks 2–5 mm. long: racemes with the peduncle 10–30 cm. long: fls. 5–6 mm. across, whitish, on pedicels 2–3 mm. long: berries about 2 cm. long, lavender-purple; seeds 5–6 mm. long, black. Fl. v; fr. IX–X. H.I.29:2842. (*Holboellia c.* Diels.) C. and W. China. Intr. 1907. Zone VII?—Vigorous climber with large and handsome lvs. resembling those of Phaseolus in size and shape: fls. rather inconspicuous, but the long racemes of blue fruits would prove attractive if produced under cult.

5. **SARGENTODÓXA** Rehd. & Wils. Deciduous twining shrub: buds with several imbricate scales: lvs. long-petioled, 3-foliolate: fls. dioecious,

campanulate, on slender pedicels with 2 minute bractlets, in the axils of scarious bracts in pendulous racemes: sepals 6, petaloid; nectaries 6, minute, suborbicular; stamens 6, with short filaments; pistillate fls. unknown: fr. consisting of a thick ovoid torus with numerous stipitate subglobose berry-like carpels, each with a single ovoid glossy black seed. (After C. S. Sargent, director of the Arnold Arboretum; Greek *doxe*, glory.) Monotypic.

S. cuneàta Rehd. & Wils. Climbing to 7 m. or more: lfts. 3, unequal, short-acuminate, light green below, the terminal one rhombic-ovate, cuneate at base, 7–12 cm. long, on a stalk 5–10 mm. long, the lateral ones slightly larger, subsessile, semi-ovate, very oblique at base and palmately 2–3-veined: staminate fls. campanulate, 1–1.2 cm. long, greenish yellow, fragrant, in pendulous racemes 10–15 cm. long; pedicels about 1.5 cm. long: mature carpels subglobose, about 8 mm. long, dark blue and bloomy, on a fleshy stipe of about equal length; seed subglobose-ovoid, 5 mm. long, truncate at base. Fl. v; fr. IX–X. H.I.19:1817 (except the fr. which belongs to the preceding genus). (*Holboellia c.* Oliv., partly.) E. and C. China. Intr. 1907. Zone VII or VIII?—Vigorous vine with handsome lvs. resembling those of Phaseolus; valued for its fragrant yellowish fls.

28. BERBERIDACEAE Torr. & Gray. BARBERRY FAMILY

Herbs or woody plants: lvs. alternate, simple or compound; petioles dilated at base or stipulate: fls. perfect, solitary, or in cymes, racemes or panicles: sepals and petals imbricated, usually in 2 rows of 3, rarely 2 or 4; stamens free, as many as petals and opposite to them; filaments short; anthers opening with 2 valves, rarely by a longitudinal slit: ovary superior, consisting of one carpel, with few to many ovules, rarely only one, on the ventral suture or at base; style short or wanting; stigma usually peltate: fr. a berry or pod; seeds anatropous, with endosperm; embryo usually small, straight.—Ten genera with more than 200 species distributed through the n. hemisphere, only Berberis extending in S. Amer. to the Straits of Magellan.

A. Lvs. compound, evergreen; unarmed shrubs.
  B. Lvs. tripinnately compound; lfts. entire: fls. white ..... 1. *Nandina*
  BB. Lvs. simply pinnate; lfts. usually toothed: fls. yellow ..... 2. *Mahonia*
AA. Lvs. simple or occasionally 3-foliolate: deciduous or evergreen: spiny shrubs, rarely unarmed.
  B. Lvs. usually simple with occasional 3-foliolate lvs. mixed in: unarmed half-evergreen shrub ..... 3. *Mahoberberis*
  BB. Lvs. always simple, deciduous or evergreen: usually spiny shrub ..... 4. *Berberis*

1. **NANDÌNA** Thunb. Evergreen shrub: lvs. usually thrice pinnate; rhachis articulate; lfts. entire: fls. in large terminal panicles; sepals in numerous whorls of 3, gradually passing into the white petals; nectaries 3 or 6; anthers opening with longitudinal slit: fr. a 2-seeded globular berry. (Its Japanese name.) Monotypic.

N. doméstica Thunb. Upright shrub with unbranched stems, glabrous: lvs. 30–50 cm. long; lfts. subsessile, elliptic-lanceolate, 3–10 mm. long, acuminate, cuneate at base, coriaceous: fls. about 6 mm. across, white, in upright panicles 20–35 cm. long: fr. globular, 8 mm. across, bright red or purplish, rarely white. Fl. VI–VII. B.M.1109(c). Gn.23:329;58:13. R.H.1923:340,t(c). G.M.51:665. C. China to Japan. Intr. 1804. Zone VII or VIII?—Handsome evergreen shrub with graceful foliage tinged red when unfolding, changing to purple in autumn; chiefly valued for its large panicles of bright red fr.

2. **MAHÒNIA** Nutt. Evergreen unarmed shrubs, rarely small trees: terminal buds with numerous persistent pointed scales: lvs. alternate, odd-pinnate, rarely 3-foliolate; lfts. usually spinose-dentate, the lateral sessile;

stipules minute, subulate: fls. yellow in usually many-fld. racemes or panicles springing from the axils of the bud-scales; sepals 9; petals 6: ovary usually with few ovules: fr. dark blue and bloomy, rarely red or whitish. (After Bernard M'Mahon, a prominent American horticulturist; 1775–1816.) Syn.: *Odostemon* Raf. About 50 species in N. and C. Am. and in E. and S. Asia.

A. Lfts. leathery, 3–13.
  B. Petioles 2–5 cm. long; lfts. 3–9, spinulose-dentate.
    C. Lvs. dull green above; plant rarely exceeding 0.25 m., stoloniferous....1. *M. repens*
    CC. Lvs. lustrous dark green above; plant 1–2 m. high....2. *M. Aquifolium*
  BB. Petioles 5–15 mm. long; lfts. 7–13, sinuately spiny-toothed....3. *M. pinnata*
AA. Lfts. rigidly coriaceous, sinuately spiny-toothed.
  B. Lfts. 3–7, 1–2.5 cm. long: racemes few-fld....4. *M. Fremontii*
  BB. Lfts. 9–19, large.
    C. Stem scarcely 0.25 m. high; petioles long....5. *M. nervosa*
    CC. Stems tall: petiole short....6. *M. Bealii*

1. M. rèpens G. Don. Stoloniferous shrub, to 0.25 m. high: lfts. 3–7, broad-ovate to ovate, 3–6 cm. long, spinulose-dentate, dull bluish green above, with distinct papillae below, leathery; petioles 2–3 cm. long: racemes 3–7 cm. long, clustered at end of the brs.: fr. black, bloomy, 6–7 mm. thick. Fl. v; fr. IX. B.R.1176(c). L.B.19:1847(c). (*Berberis r.* Lindl., *B. Aquifolium* Brit., *Odostemon Aquifolium* Rydb., *B. nana* Greene.) B. C. to N. Mex. and Calif. Intr. 1822. Zone V.—Var. **rotundifòlia** Fedde. Shrub to 1 m.: lfts. usually 5–7, broad-ovate, finely and sparingly serrate or nearly entire. R.H. 1907:163. Gs.4:222. (*Berberis rotundifolia Herveyi* Hort.)—Var. **subcordàta** Rehd. Lfts. 5–7, crowded and overlapping, broad-ovate, subcordate at base, with few mucronate spreading teeth.—Var. **macrocárpa** Jouin. Upright, to 1 m.: lfts. 5–7, spiny-dentate, slightly lustrous: fr. larger. This is possibly a hybrid of this species and the following.—Low suckering shrub, less handsome than *M. Aquifolium*; the lvs. not changing to red in autumn.

2. **M. Aquifòlium** Nutt. Shrub to 1, rarely 2 m. tall: lfts. 5–9, ovate to oblong-ovate, 3.5–8 cm. long, rounded or truncate at base, sinuately spiny-dentate, lustrous dark green above, rarely dull, without distinct papillae below, stiff and leathery; petioles slender, 2–5 cm. long: racemes fascicled, erect, 5–8 cm. long, at end of the brs.: fr. bluish black, bloomy, about 8 mm. across. Fl. IV–V; fr. IX. B.R.1425(c). L.B.18:1718(c). Pursh, Fl. Am. Sept. 1:t.4. Gn.86:260(h). (*Berberis A.* Pursh, *B. nutkana* Kearney, *Odostemon nutkanus* Rydb.) B. C. to Ore. Intr. 1823. Zone V.—Var. **juglandifòlia** Jouin. Lfts. usually 7, often subcordate, smaller and of thicker texture; rhachis usually red.—Handsome evergreen shrub with dark green lvs. becoming purplish in autumn, and with bright yellow fls. in spring; prefers a partly shaded position.

M. A. × *Fortunei* = **M. heterophýlla** Schneid. Lfts. 5–7, lanceolate, 4–8 cm. long, spiny-toothed, lustrous above. (*Berberis h.* Zabel, not Juss., *B. toluacensis* Hort.) Origin unknown.—*M. A.* × *Berberis vulgaris* = *Mahoberberis Neuberti;* see p. 234.

3. M. pinnàta Fedde. Upright shrub to 4 m.: lfts. 7–13, ovate to ovate-lanceolate, sinuately spiny-toothed, slightly lustrous above, without distinct papillae and green beneath; petioles very short: fls. pale yellow, in fascicled racemes 6–8 cm. long, axillary along the stem: fr. globose-ovoid, purplish black. B.M.2396(c). B.R.702(c). R.H.1907:162. (*Berberis p.* Lag., *B. Aquifolium* var. *fascicularis* Bean, *M. fascicularis* DC.) Calif. and N. Mex. to Mex. Intr. 1819. Zone VII or VIII.—Handsome shrub, taller than *M. Aquifolium* and with similar foliage, but duller.

M. p. × *Aquifolium* = **M. Wàgneri** Rehd. Upright shrub to 2.5 m.: lfts. 7–11, usually ovate-oblong, with 4–7 teeth on each side, dark green and slightly lustrous above; petioles 5–30 mm. long: fls. and fr. like *M. pinnata.* M.D.1910:89(h).

(*M. pinnata* var. *W.* Jouin.) Orig. before 1863. Zone VI?—Similar in habit to *M. pinnata*, but much hardier.

4. **M. Fremôntii** Fedde. Shrub to 4 m.: lfts. 3–7, ovate-oblong to lanceolate, 1.5–4 cm. long, with few large spiny teeth on each side, dull bluish green, rigidly coriaceous; petiole very short: fls. pale yellow, on slender pedicels to 2 cm. long in the axils of minute lanceolate bracts in few-fld. racemes: fr. subglobose, 8–15 mm. across, bluish black. Fl. v–vi; fr. viii. G.F.1:497. B.C.4:1971. (*Berberis F.* Woot.) W. Tex. to Colo. and Calif. Cult. 1895. Zone VI.—Upright shrub with pale bluish green small foliage and comparatively large bluish black fruit.

Closely related species are: **M. haematocárpa** Fedde, chiefly distinguished by its red fruit about 8 mm. across. M.G.32:89(h). (*Berberis h.* Woot.) N. Mex., Colo. Intr. 1916. Zone VII?—Very handsome in fr. which like that of the following species is used for jams.—**M. Swaseÿi** Fedde. Shrub to 1.5 m.: lfts. 5–11, elliptic to oblong-lanceolate, thinner, reticulate: infl. with broad-ovate bracts about 5 mm. long: fr. about 1 cm. across, red. Jour. Hered.12:427. (*Berberis S.* Buckl.) Tex. Intr. 1917. Zone VII?—**M. trifoliolâta** Fedde. Shrub to 2.5 m.: lfts. 3, rigid; petiole 5–50 mm. long: fr. red. B.R.31:10(c). F.S.1:t.56(c). (*Berberis t.* Moric.) N. Mex. and Tex. to Mex. Intr. 1839. Zone VIII?

5. **M. nervôsa** Nutt. Shrub to 0.5 m. tall, usually lower; the stem with conspicuous persistent lanceolate bud-scales 2–3 cm. long: lvs. with the stalk 18–40 cm. long; lfts. 11–19, obliquely ovate to ovate-lanceolate, 4–8 cm. long, with 3–5 nerves at base, sinuately spiny-dentate, lustrous above, pale beneath, rigidly coriaceous; petioles 5–12 cm. long: fls. bright yellow in erect racemes 10–20 cm. long: fr. ovoid, dark blue, bloomy, about 8 mm. across. Fl.v–vi; fr. vii–viii. B.M.3949(c). B.R.1426(c). L.B.18:1701(c). B. C. to Calif. Intr. 1822. Zone V.—Low evergreen shrub with large lustrous lvs.

6. **M. Beàlii** Carr. Shrub to 4 m., with stout upright stems: lvs. 30–40 cm. long; lfts. 9–15, roundish ovate to ovate-oblong, 5–12 cm. long, with 2–5 large spiny teeth on each side, the lateral ones very oblique at base, the lowest pair much smaller and close to the base of the petiole, the terminal lft. stalked, truncate or subcordate at base, larger than the others, dull dark bluish green above, glaucescent beneath, rigidly coriaceous; petioles 1–2 cm. long: fls. lemon-yellow, fragrant in fascicled upright stout racemes 8–15 cm. long, the fls. crowded on pedicels about 5 mm. long, with small bracts at base: fr. bluish black. B.M.4846,4852(c). F.S.6:t.79. Gn.87:574(h);88:107 (h);89:171. M.O.60(h). (*M. japonica* var. *B.* Fedde, *Berberis B.* Fort.) China. Intr. 1845. Zone (V), VI.—A striking evergreen shrub with large bold foliage and large clusters of pale yellow fragrant flowers. In cult. usually under the name *M.* or *Berberis japonica.*

A closely related species is **M. japónica** DC. Similar to *M. Bealii:* lfts. usually ovate-oblong, with an elongated lanceolate tooth at the apex, with 5–6 teeth on the lower side, mostly pointing forward, yellowish green beneath, less rigid: racemes 10–20 cm. long, rather lax, the fls. nodding, on slender pedicels 6–7 mm. or sometimes to 1 cm. long, with conspicuous ovate bracts: fr. dark purple, bloomy. Thunberg, Icon. Pl. Jap.4,t.2. Gn.89:171. Cult. in Japan, very rare in western gardens.

3. × **MAHOBÉRBERIS** Schneid. Unarmed half-evergreen shrub; a hybrid between *Mahonia Aquifolium* and *Berberis vulgaris*, the only one known so far between these two genera. Resembles Mahonia in the unarmed brs., in the solitary, not fascicled lvs. on the shoots and the occurrence of 3-foliolate or pinnate lvs.; the influence of Berberis is shown in the usually simple lvs., thinner and serrulate on the older brs., while those of the shoots are more coriaceous and sinuately spiny: fls. and frs. not known.

M. Neubérti Schneid. Shrub to 2 m.: lvs. usually simple, obovate-oblong

or oblong, 3–7 cm. long, cuneate at base, serrulate or those of the shoots sinuately spiny, or compound with 3–5 lfts. (*Berberis N.* Baumann, *M. N.* var. *ilicifolia* Schneid.) Orig. before 1854.—Var. **latifòlia** Schneid. Lvs. of the shoots broader, truncate or broad-cuneate at base. (*B. latifolia*, *B. ilicifolia* Hort., not Forst.)—Subevergreen shrub without striking ornamental qualities.

4. **BÉRBERIS L.** Barberry. Evergreen or deciduous spiny shrubs, rarely small trees; the inner bark and wood yellow: lvs. alternate, simple, those of the shoots changed into usually 3-parted spines, the normal lvs. appearing in fascicles on short axillary spurs: fls. yellow in elongated or umbel-like, rarely compound racemes, or solitary or fascicled; sepals 6, with 2 or 3 bractlets below; petals 6, often smaller than the sepals and usually with 2 nectariferous glands at base; stamens 6, irritable, the anthers opening with 2 valves; ovary with 1 to many ovules; stigma sessile or on a short style: fr. a 1- to several-seeded red to black berry. (Name derived from the Arabic name of the fr.) About 175 species, particularly well developed in E. and C. Asia and in S. Am., few in N. Am., Eu. and N. Afr.—Almost all species are desirable ornamental shrubs with handsome foliage, evergreen in some species and in many deciduous ones assuming bright autumn tints, with conspicuous, mostly bright yellow fls. in spring, and variously colored, often scarlet frs. in autumn and often persisting during the winter.

I. Lvs. evergreen or half-evergreen

A. Lvs. entire.
B. Lvs. elliptic to obovate: fls. solitary ..... 1. *B. buxifolia*
BB. Lvs. narrow-oblong to linear.
C. Fls. 1–2: lvs. linear ..... 2. *B. empetrifolia*
CC. Fls. 2–6 in peduncled umbels: lvs. narrow-oblong ..... 3. *B. stenophylla*
AA. Lvs. dentate (sometimes entire in Nos. 4, 25 and 27).
B. Brts. pubescent, puberulous or verruculose.
C. Lvs. green beneath; brts. pubescent or puberulous.
D. Lvs. evergreen, 1–3 cm. long, obovate: fls. in racemes ..... 5. *B. Darwinii*
DD. Lvs. half-evergreen, 2.5–8 cm. long: fls. in panicles ..... 25. *B. chitria*
CC. Lvs. glaucous or glaucescent beneath.
D. Fls. in racemes or panicles: lvs. 2.5–8 cm. long: brts. puberulous ..... 27. *B. lycium*
DD. Fls. 1–2: lvs. 1–2.5 cm. long: brts. verruculose ..... 6. *B. verruculosa*
BB. Brts. glabrous: fls. in fascicles or solitary.
C. Lvs. glaucous beneath.
D. Brts. angled: lvs. half-evergreen.
E. Lvs. obovate to broad-elliptic with several teeth on each side .. 16. *B. concinna*
EE. Lvs. usually obovate-oblong with 1–2 teeth on each side, sometimes entire. 4. *B. heterophylla*
DD. Brts. terete: lvs. evergreen.
E. Lvs. elliptic to elliptic-oblong, spiny-toothed: fls. yellow ..... 7. *B. pruinosa*
EE. Lvs. lanceolate to narrow-lanceolate, with 1–5 small aristate teeth on each side: fls. whitish, tinged red ..... 8. *B. triacanthophora*
CC. Lvs. green beneath, narrow-elliptic to lanceolate.
D. Lvs. thinly coriaceous, lanceolate to narrow-lanceolate.
E. Young brts. reddish: fr. bloomy; pedicels 2–3.5 cm. long ..... 9. *B. Veitchii*
EE. Young brts. yellowish: lvs. rarely more than 1 cm. broad.
F. Fr. ovoid, bloomy, with sessile stigma: pedicels 1–2 cm. long. 10. *B. Gagnepainii*
FF. Fr. subglobose, jet-black, with distinct style: pedicels 0.5–1 cm. long. 11. *B. atrocarpa*
DD. Lvs. strongly coriaceous, rigid, narrow-elliptic to oblong-lanceolate.
E. Brts. quite terete, reddish while young: lvs. slightly reticulate beneath. 12. *B. Sargentiana*
EE. Brts. slightly angled, yellowish brown while young: lvs. with the veinlets invisible ..... 13. *B. Julianae*

II. Lvs. deciduous

A. Fls. solitary or fascicled or sometimes in few-fld. umbels.
B. Lvs. all entire, small.
C. Young brts. glabrous: lvs. not reticulate: fls. slender-stalked ..... 34. *B. Thunbergii*
CC. Young brts. puberulous: lvs. reticulate: fls. in very short-stalked dense clusters. 20. *B. Wilsonae*

BB. Lvs. dentate or only partly entire.
C. Fls. solitary on short pedicels not exceeding 5 mm.
D. Lvs. green and reticulate beneath, finely toothed.....15. *B. sibirica*
DD. Lvs. glaucous beneath, often entire: brts. usually bloomy.....14. *B. dictyophylla*
CC. Fls. on slender pedicels or in umbels.
D. Lvs. with rather remote teeth, often entire.
E. Brts. terete or nearly so, red-brown and lustrous the second year: fr. bluish black and bloomy.
F. Lvs. obovate to obovate-oblong, 1–1.5 cm. broad, bright green, usually toothed.....35. *B. virescens*
FF. Lvs. broad-elliptic to obovate, 1.5–2.5 cm. broad, bluish green, usually entire.....31. *B. heteropoda*
EE. Brts. grooved or angled, dull brown or gray.
F. Brts. puberulous: fls. solitary.....19. *B. angulosa*
FF. Brts. glabrous.
G. Lvs. all spiny-toothed, 0.6–3.5 cm. long, white beneath.
H. Fls. 1–2, slender-stalked.....16. *B. concinna*
HH. Fls. in dense clusters, not exceeding 1 cm.: lvs. 6–15 mm. long. 21. *B. parvifolia*
GG. Lvs. partly entire, 2–4 cm. long, glaucescent and reticulate beneath: fls. several, slender-stalked: fr. with short style.....17. *B. diaphana*
DD. Lvs. closely setose-serrulate.
E. Brts. grooved, dull grayish: lvs. obovate: fls. usually 2....18. *B. circumserrata*
EE. Brts. angled, red-brown: lvs. oblong-obovate: fls. in 3–6-fld. umbels. 40. *B. Sieboldii*

AA. Fls. in panicles. (See also AAA.)
B. Panicles short, dense, upright; brts. puberulous.
C. Lvs. always entire, oblanceolate to obovate.....20. *B. Wilsonae*
CC. Lvs. spinose-dentate.
D. Lvs. 6–15 mm. long: infl. 5–10 mm. long.....21. *B. parvifolia*
DD. Lvs. 1–2.5 cm. long: infl. paniculate, 1–3 cm. long.....22. *B. aggregata*
BB. Panicles slender, elongated, pendulous.
C. Brts. angled, grayish brown: lvs. 1–3.5 cm. long, serrate, reticulate: pedicels 2–5 mm. long.....23. *B. polyantha*
CC. Brts. terete: lvs. 3–8 cm. long: pedicels 5–20 mm. long.
D. Brts. glabrous: lvs. deciduous.
E. Fr. red: lvs. acute, serrate.....26. *B. Francisci-Ferdinandi*
EE. Fr. purple-black, bloomy: lvs. obtuse, often entire.....32. *B. oblonga*
DD. Brts. puberulous: lvs. half-evergreen, often entire.
E. Lvs. green beneath: infl. paniculate; peduncle 2–4 cm. long.....25. *B. chitria*
EE. Lvs. glaucescent beneath: infl. racemose or paniculate; peduncle usually short. 27. *B. lycium*

AAA. Fls. in simple racemes.
B. Lvs. glabrous.
C. Brts. glabrous.
D. Lvs. entire, all or most of the flowering brs.: brts. brown or purplish the second year.
E. Brts. grooved or angled: fr. bright red.
F. Lvs. obovate to obovate-oblong, glaucescent beneath.
G. Racemes umbel-like; 3–10-fld.: lvs. always entire...34. *B. Thunbergii* var.
GG. Racemes usually many-fld.; pedicels 1–2 cm. long: lvs. often serrate. 33. *B. Silva-Taroucana*
FF. Lvs. oblanceolate or oblong: racemes many-fld.
G. Bracts at least ½ as long as the short pedicels: lvs. entire.
H. Pedicels 1–2 mm., in fr. sometimes to 4 cm. long: racemes dense; fls. 3–4 mm. across.....30. *B. Vernae*
HH. Pedicels 3–5 mm. long, in fr. sometimes 1 cm. long: racemes not dense; fls. about 6 mm. across.....36. *B. Poiretii*
GG. Bracts much shorter than the slender pedicels: lvs. sometimes dentate. 37. *B. chinensis*
EE. Brts. terete or slightly angled.
F. Racemes short, 5–7-fld.; ovules 4–6, long-stipitate: fr. bluish black. 31. *B. heteropoda*
FF. Racemes dense, many-fld.; ovules 2–3, subsessile.
G. Fr. dark red, bloomy: lvs. with stomata above.....29. *B. turcomanica*
GG. Fr. pale red: lvs. without stomata above.....28. *B. nummularia*
DD. Lvs. serrate or dentate.
E. Brts. brown, red or purple the second year.
F. Lvs. remotely dentate or serrulate, occasionally entire; veinlets usually indistinct beneath.
G. Fr. bright red.
H. Pedicels 4–10 mm. long.
I. Lvs. glaucescent beneath, often obtuse.
J. Brts. slightly verruculose: pedicels as long or longer than the short-ovoid fr.....38. *B. canadensis*
JJ. Brts. smooth: pedicels usually shorter than the oblong-ovoid fr. 43 *B. Henryana*

II. Lvs. light green beneath, acute, elliptic-oblong to oblanceolate.
J. Brts. nearly terete: fr. globose-ovoid, about 6 mm. long; pedicels 5 mm. long....39. *B. Fendleri*
JJ. Brts. grooved: fr. oblong-ovoid, 1 cm. long; pedicels about 1 cm. long....37. *B. chinensis*
HH. Pedicels 1–2 cm. long: lvs. broad-obovate to elliptic, glaucescent beneath. 33. *B. Silva-Taroucana*
GG. Fr. dark purple, bloomy, oblong-ovoid: racemes few-fld.: brts. terete. 35. *B. virescens*
FF. Lvs. densely serrulate, never entire, reticulate beneath.
G. Racemes many-fld.: lvs. obovate to obovate-oblong.
H. Brts. grooved: lvs. rounded at apex, grayish green beneath: fr. subglobose....42. *B. koreana*
HH. Brts. terete or nearly so: lvs. acute or obtuse, light green beneath: fr. oblong-ovoid.
I. Lvs. all short-stalked: racemes short, nodding..41. *B. Bretschneideri*
II. Lvs. of fertile brs. mostly on slender stalks 2–4 cm. long: racemes upright, 5–7 cm. long....44. *B. dasystachya*
GG. Racemes 3–6-fld.: lvs. narrow-elliptic to oblong: brts. angular. 40. *B. Sieboldii*
EE. Brts. gray or grayish yellow the second year: fr. oblong-ovoid.
F. Brts. nearly terete, grayish yellow: fr. purplish blue; style distinct. 24. *B. aristata*
FF. Brts. grooved, gray: fr. scarlet or purple; stigma sessile.
G. Lvs. reticulate beneath, densely ciliate-serrate; petals slightly emarginate. 48. *B. amurensis*
GG. Lvs. setulose-dentate, not reticulate: petals entire at apex. 49. *B. vulgaris*
CC. Brts. puberulous: lvs. usually oblanceolate, often entire: fls. slender-stalked, in racemes: fr. bluish black....27. *B. lycium*
BB. Lvs. pubescent, acute: racemes slender; pedicels very short.
C. Brts. and rhachis of infl. pubescent.
D. Lvs. slightly pubescent above, 2.5–5 cm. long: brts. brown....45. *B. Gilgiana*
DD. Lvs. densely pubescent above, 4–8 cm. long: brts. gray....46. *B. brachypoda*
CC. Brts. and rhachis glabrous: lvs. glabrous above, 4–8 cm. long....47. *B. Giraldii*

Group 1. BUXIFOLIAE Schneid. Lvs. evergreen, small: fls. solitary or 2–5 fascicled; ovules 8–12; stigma sessile.

1. **B. buxifòlia** Poir. Evergreen upright shrub to 3 m.; brts. brown, usually puberulous, grooved; spines 3-fid or simple, usually not longer than 1.5 cm.: lvs. obovate to elliptic, 1–2.5 cm. long, spiny-pointed, cuneate at base, entire: fls. 1–2, orange-yellow, on slender pedicels 2–2.5 cm. long: fr. subglobose, dark purple. B.M.6505(c). L.B.20:1941(c). G.W.7:414. (*B. dulcis* Sweet.) Chile, Straits of Magellan to Valdivia. Intr. 1826. Zone (V) VI.—Var. **nana** Schneid. Dwarf compact form.—Var. **pygmaèa** Schneid. Dwarf tufted form with slender unarmed brts. and partly juvenile, stalked and serrate lvs.—Var. **spinosíssima** Reiche. Spines to 3 cm. long, usually longer than the lvs.—Handsome compact shrub, one of the hardiest of the evergreen barberries, but in severe winters often loosing its lvs.

2. **B. empetrifòlia** Lam. Evergreen shrub to 0.5 m.; brts. slender, often prostrate, slightly angled, glabrous, often bloomy: spines 3-fid or simple, 5–15 mm. long: lvs. linear, 5–20 mm. long, spiny pointed, entire and strongly revolute at the margin, bright green; fls. 1–2, golden-yellow, 8 mm. across, on slender pedicels 5–15 mm. long: fr. nearly black. B.R.26:27(c). S.B.4: 350(c). Chile to Straits of Magellan. Intr. 1827. Zone VI?—Low evergreen shrub, best suited for the rockery.

3. × **B. stenophýlla** Lindl. (*B. Darwinii* × *empetrifolia.*) Evergreen shrub to 3 m.: brts. slender, terete, puberulous; spines usually 3-fid, 3–7 mm. long: lvs. narrow-lanceolate, 1.5–2.5 cm. long, spiny-pointed, with revolute margin, dark green above, whitish beneath: fls. golden yellow, 1 cm. across, in small fascicles or short 2–6-fld. racemes; pedicels 5–10 mm. long: fr. subglobose, 6–7 mm. across, black, bloomy. F.M.4:252(c). G.C.III.7:619. R.H.1906:417;1913:535,t(c). Gn.86:259,408(h);87:92(h). Orig. before 1864. Zone (V) VI.—Handsome graceful shrub covered with golden yellow fls. in

spring. A great many forms reverting more or less to one or the other parent have been raised from seed.

Group 2. Actinacanthae Schneid. Lvs. evergreen or half-evergreen, usually toothed: fls. solitary or fascicled or in umbel-like racemes; ovules 2–6; style short or wanting.

4. **B. heterophýlla** Juss. Half-evergreen shrub to 1.5 m.; brts. yellowish brown, glabrous, grooved; spines 3–7-fid, 1–2 cm. long: lvs. narrowly obovate and entire, or obovate with 3–5 large spiny teeth, 1–3 cm. long: fls. solitary; pedicel about 8 mm. long; sepals and petals incurved: fr. black, bloomy. H.E.1,t.14(c). Chile to Straits of Magellan. Cult. 1823. Zone VII?—Very spiny half-evergreen straggling shrub.

Into this group also belong the two following species: **B. actinacántha** Mart. Half-evergreen; brts. pubescent; spines 3-parted or sometimes leaf-like: lvs. broad-obovate to oblong, 1–3 cm. long, sparingly spiny: fls. 3–6, fascicled. B.R.31:55(c). Intr. before 1845. Zone VIII.—**B. hakeoïdes** Schneid. Evergreen shrub to 4 m.; spines small or leafy: lvs. suborbicular, 1.5–3 cm. long, rounded or subcordate at base, spiny-toothed: fls. in dense subglobose clusters: fr. bluish black. B.M.6770 (c). G.C.III.29:295. B.S.1:241. (*B. congestiflora* var. *h.* Hook. f.) Chile. Intr. 1861. Zone VIII?

Group 3. Ilicifoliae Schneid. Lvs. evergreen, usually toothed: fls. racemose; ovules 3–5; style distinct.

5. **B. Darwìnii** Hook. Evergreen upright shrub to 3.5 m.; brts. subterete, red-brown, pubescent; spines slender, 3–7-parted, 3–7 mm. long: lvs. obovate to obovate-oblong, 1–3 cm. long, cuneate at base, remotely spiny-toothed and usually 3-spined at apex, lustrous and dark green above, light green beneath: fls. golden-yellow, tinged with red, in pendulous racemes 4–10 cm. long: fr. ovoid, about 8 mm. long, dark purple, with long style. B.M.4590(c). F.S.7: t.663(c). R.H.1913:525,t.,f.1(c). Gn. 86:260(h). Chile. Intr. 1849. Zone VIII?—Handsome evergreen shrub with lustrous dark green lvs. and golden-yellow fls. in spring.

B. D. × *empetrifolia* = *B. stenophylla;* see No. 3.

A related species is **B. ilicifòlia** Forst. Evergreen straggling shrub with grooved glabrous or puberulous brts.: lvs. obovate, 2–5 cm. long, with a few spiny teeth toward the apex: fls. orange-yellow, in dense short racemes. B.M.4308(c). S. Chile. Intr. about 1843. Zone VII?

Group 4. Wallichianae Schneid. Lvs. evergreen, elliptic to narrow-lanceolate: fls. solitary or fascicled, 2–25; ovules 1–6; style very short or wanting: fr. purple-violet or black.

6. **B. verruculòsa** Hemsl. & Wils. Evergreen low shrub to 1 m.; brts. terete, densely verruculose; spines slender, 3-parted, 1–2 cm. long: lvs. elliptic or ovate to ovate-lanceolate, 1.5–2.5 cm. long, remotely spiny-toothed with revolute margin, lustrous dark green above, glaucous beneath: fls. 1–2, 1.5 cm. across, golden-yellow; pedicel 5–10 mm. long: fr. ellipsoid, about 8 mm. long, violet-black, bloomy; stigma sessile. B.M.8454(c). M.G.32:34(h). S.L.120(h). W. China. Intr. 1904. Zone (V) VI.—Dense low evergreen shrub with glossy dark green lvs. and large yellow fls.

A related species is **B. candídula** Schneid. Dwarf shrub; brts. glabrous: lvs. elliptic, 1.5–3 cm. long, with few spiny teeth, white beneath; fls. solitary, pedicel 1–1.5 cm. long. V.F.15. (*B. Wallichiana* var. *pallida* Bois.) C. China. Intr. 1894. Zone V.

7. **B. pruinòsa** Franch. Evergreen shrub to 3 m.; brts. terete, yellowish or brownish yellow; spines stout, 3-parted, 1–3 cm. long: lvs. obovate or elliptic to elliptic-oblong, 2.5–5 cm. long, spiny-toothed, lustrous dark green above, white beneath: fls. 8–25; pedicels about 1 cm. long, fascicled or on a short peduncle: fr. oblong-ovoid, 6–7 mm. long, bluish black, bloomy. S. W. China. Intr. 1894. Zone VII?—Handsome evergreen shrub of vigorous growth.

B. p. × *diaphana?* = **B. Vilmorînii** Schneid., which differs chiefly in the grooved brts., in the thinner and smaller lvs. with smaller and more numerous teeth and in the few-fld. infl. Orig. before 1905.

8. **B. triacanthóphora** Fedde. Shrub to 1.5 m., with spreading slender brs.; brts. reddish, becoming red-brown the 2d year; spines slender 1–2.5 cm. long: lvs. lanceolate to narrow-lanceolate, 2–5 cm. long, 4–8 mm. wide, with 1–5 small setose teeth on each side, bright green above, glaucous or glaucescent beneath: fls. 2–5, fascicled, subglobose, 7–8 mm. across, whitish, tinged red; pedicels slender 1.2–3 cm. long: fr. ellipsoid, 7–8 mm. long, blue-black, slightly bloomy. Fl.v. C. China. Intr. 1907. Zone V.—One of the most graceful and hardiest of the evergreen barberries.

9. **B. Veîtchii** Schneid. Evergreen shrub; brts. subterete, reddish when young, yellowish gray the second year; spines stout, 3-parted, 2–5 cm. long: lvs. lanceolate, 6–12 cm. long, sinuately spiny-toothed, dark green above, lighter beneath, with indistinct veinlets, thinly coriaceous: fls. 1 cm. across, in 4–8-fld. fascicles; pedicels 2–3.5 cm. long; ovules 2–4: fr. oblong, 1–1.2 cm. long, black, bloomy. Veitch, Novelties,1907:13. (*B. acuminata* Veitch, not Franch.) C. China. Intr. 1900. Zone VI–VII.

B. V. × *vulgaris?* = **B. Vanfleètii** Schneid. Brts. slightly terete: lvs. elliptic, acute, spinose-serrate, with 8-12 teeth on each side, chartaceous: fls. in umbel-like racemes: fr. dark cherry-red, slightly pruinose. Orig. before 1915.

10. **B. Gagnepaînii** Schneid. Evergreen shrub to 2 m.; brts. terete, slightly verruculose, yellowish gray; spines slender, 3-parted, 1–2 cm. long: lvs. narrow-lanceolate, 3–10 cm. long, sinuately spiny-serrate, with revolute margin, light green beneath and indistinctly veined, thinly coriaceous: fls. in fascicles of 3–10, 1 cm. across, bright yellow; pedicels 1–2 cm. long: fr. ovoid, 8–10 mm. long, bluish black, bloomy, with nearly sessile stigma. B.M.8185(c). G.C.III.46:226. M.G.32:1(h). Gn.89:585(h). (*B. acuminata* Stapf, not Franch.) W. China. Intr. 1904. Zone VI?—Handsome evergreen shrub with spreading brs.

Closely related species are: **B. sanguínea** Franch. differing chiefly in the smooth grooved brts., in the fewer teeth (6–15 pairs) of the lvs. and in the red color of the pedicels and of the outside of the fls. V.F.16. W. China. Intr. 1898. Zone VII?—**B. replicàta** W. W. Sm. Brts. yellowish; lvs. 2–3.5 cm. long, with 1–6 pairs of teeth, strongly revolute: fr. scarlet, finally black. B.M.9076(c). J.L.49:t.13(h). S. W. China. Intr. 1917.

11. **B. atrocárpa** Schneid. Evergreen shrub to 2 m.; brts. yellowish, grooved; spines 1–4 cm. long: lvs. lanceolate or oblanceolate to oblong-lanceolate, 2.5–7 cm. long, remotely spiny-serrate, yellowish green beneath with indistinct veins, coriaceous: fls. 6–12, fascicled; 8–12 mm. across; pedicels 5–10 mm. long: fr. short-ovoid, 5 mm. long, jet-black, not bloomy at maturity, with a short, but distinct style. B.M.8857(c). (*B. levis* Bean, not Franch.) W. China. Intr. 1909. Zone VII?

12. **B. Sargentiàna** Schneid. Evergreen shrub to 2 m.; brts. terete, reddish while young, yellowish gray or grayish brown the 2nd year; spines rigid, 3-parted, 1–3 cm. long: lvs. elliptic-oblong or oblong to oblong-lanceolate, 4–10 cm. long, rather closely spiny-serrate, dark green above, light green and slightly reticulate beneath, firmly coriaceous: fls. fascicled, yellow, about 1 cm. across; pedicels 1–2 cm. long: fr. ovoid, 6–7 mm. long, bluish black, slightly bloomy; stigma sessile. C. China. Intr. 1907. Zone VI?—A very handsome evergreen barberry with somewhat spreading brs.

13. **B. Juliànae** Schneid. Evergreen shrub to 2 m.; brts. slightly angled, yellowish when young, light yellowish gray or yellowish brown the 2nd year; spines rigid, 3-parted, 1–3 cm. long: lvs. narrow-elliptic to lanceolate or

oblanceolate, 3–6 cm. long, spiny-serrate, dark green above, much paler and indistinctly veined beneath, rigidly coriaceous: fls. fascicled; pedicels 1–2 cm. long: fr. ovoid-oblong, about 8 mm. long, bluish black, bloomy, with a short, but distinct style. M.G.32:35(h). S.L.119(h). C. China. Intr. 1900. Zone (V) VI.—Handsome evergreen barberry of rather upright habit; one of the hardiest of the evergreen species.

A closely related species is **B. Bergmánniae** Schneid. Lvs. smaller, 3.5–6 cm. long, sinuately serrate with 3–8 strong teeth on each side, pale and lustrous beneath: fr. very bloomy, on reddish pedicels about 1 cm. long. W. China. Intr. 1908. Zone VII?

The following species are also closely related to the two preceding species:

B. Soulieana Schneid. Brts. gray, subterete: lvs. narrow-lanceolate, usually spiny-serrate, 4–10 cm. long, 8–15 mm. broad, pale and indistinctly or scarcely veined beneath: fr. ovoid, bloomy, with short style; pedicels 1–1.5 cm. long. (*B. stenophylla* Hance, not Lindl., ? *B. sanguinea* Lemoine, not Franch.) C. China. Intr. 1897. Zone VI?—**B. Hoôkeri** Lem. Brts. slightly grooved, grayish brown: lvs. elliptic to oblong-lanceolate, 2.5–7 cm. long, sinuately spiny-serrate, white beneath, the secondary veins elevated: fls. 3–6, clustered; pedicels 1–2 cm. long, ovules 5–8: fr. oblong, 1 cm. long, black-purple. I.H.6:207,t(c). B.M.4656(c). (*B. Wallichiana* Hook., not DC.) Himal. Cult. 1859. Zone VIII?—Var. **víridis** Schneid. Lvs. green beneath.—**B. xanthóxylon** Hassk. Brts. grooved, yellowish gray or yellowish brown: lvs. elliptic-oblong to oblong-lanceolate, 4–10 cm. long, spiny-serrate with rather small forward-pointed teeth, green or yellowish green beneath and lustrous, the veins scarcely elevated: fls. numerous; pedicels 1–2 cm. long; ovules 3–5. P.F.1:79,f.58. Gard. Mag. Bot.2:120. (*B. Wallichiana* Lindl., not DC., *B. Hookeri* var. *latifolia* Bean, *B. macrophylla* Hort., *B. Knightii* Hort.) Java. Intr. 1847. Zone VIII?—**B. insígnis** Hook. f. & Thoms. Brts. subterete, yellowish gray: lvs. oblong-lanceolate, 5–12 cm. long, acuminate, spiny-serrate, green beneath, with elevated secondary veins: pedicels 5–10 mm. long; ovules usually 4: fr. ovoid-oblong, black. Sikkim-Himal. Intr. about 1850? Zone VIII? —**B. Wallichiàna** DC. Brts. grooved: lvs. similar to those of the two preceding species, but of thicker texture: fls. short-stalked; ovules 1 or 2. Wallich, Pl. As. Rar.3:t.243(c). Himal. Not in cult.

Group 5. Angulosae Schneid. Lvs. usually deciduous, often papillose beneath: fls. usually 1–3, rarely 5; ovules 2–8; style wanting or very short: fr. red or pink.

14. **B. dictyophýlla** Franch. Deciduous shrub to 2 m.; brts. slightly angular, usually reddish and very glaucous while young, red-brown the second year; spines 3-parted, 5–15 mm. long: lvs. obovate to obovate-oblong, 1–2.5 cm. long, usually entire and rounded at the apex, sometimes spiny-toothed, bright green and reticulate above, chalky-white beneath: fls. solitary, pale yellow, 1.5 cm. across, short-stalked: fr. ovoid, 1 cm. long, red, with short, but distinct style. Franchet, Pl. Delav. t.11. S. W. China. Cult. 1890. Zone V.—Var. **epruinòsa** Schneid. Brts. more strongly angled, not bloomy: lvs. glaucescent or nearly green beneath. Intr. 1910.

A closely related species is **B. approximàta** Sprague. Lvs. smaller, usually spiny-serrate: fls. nearly sessile. B.M.7833(c). B.S.1:239. W. China. Intr. about 1892. Zone V?

15. **B. sibírica** Pall. Deciduous shrub, to 0.5 m.; brts. angled, gray or grayish brown the second year; spines 3–5-, or sometimes 7–11-parted, slender, 3–8 mm. long: lvs. obovate to obovate-oblong, 1–2.5 cm. long, sinuately spiny-toothed with spreading teeth, green and reticulate beneath: fls. 1–2, 1 cm. across, on short pedicels, nodding: fr. ovoid, 7 mm. long, red. B.R.6:487(c). G.O.t.64(c). S.H.1:309,f.194t-u. Siberia. Intr. before 1781. Zone IV?—Low densely branched shrub with small bright green lvs.

B. s. × *vulgaris* = *B. emarginata;* see under No. 49.

16. **B. concínna** Hook. f. Deciduous or half-evergreen shrub, to 1 m.; brts. grooved, pale brown the second year; spines 3-parted, 1–2 cm. long: lvs. obovate, 1–3.5 cm. long, remotely spiny-dentate, bright green above, white

and reticulate beneath: fls. 1–2, 1–1.5 cm. across; pedicels 2–3 cm. long: fr. oblong, 1.5–2 cm. long, red. B.M.4744(c). Sikkim-Himal. Intr. about 1850. Zone VI?—Desirable shrub with handsome lvs., white beneath, and large bright yellow fls.

17. **B. diáphana** Maxim. Deciduous shrub to 1 or 2 m.; brts. rather stout, grooved, yellowish or yellowish gray; spines 8–30 mm. long: lvs. obovate to oblong-obovate, 2–3.5 cm. long, obtusish, spinose-serrulate or sometimes entire, glaucous and reticulate beneath: fls. bright yellow, 1.5 cm. across, solitary or 2–5 on a common peduncle; pedicels 1.5–2 cm. long; ovules 6–12: fr. ovoid-oblong, often attenuated at apex, with short style, 1–1.5 cm. long, bright or pale red, slightly bloomy. B.M.8224(c). S.T.2:t.109. M.G.32:90 (h,fr.). (*B. yunnanensis* Hutchins., not Franch.) W. China. Intr. 1894. Zone V.—Much-branched rather dense shrub with bright green lvs. turning scarlet in autumn.

B. d. × *prúinosa* = *B. Vilmorinii;* see under No. 7.

A closely related species is **B. aèmulans** Schneid. which differs chiefly in the reddish or purplish brts.: fr. 1.5–1.8 cm. long; pedicels 2–3 cm. long, 1–3, without or very short peduncle. W. China. Intr. 1908. Zone V.—Other related species are the following: **B. Tíschleri** Schneid. Brts. reddish or purple: lvs. rarely entire: infl. a 4–10-fld. raceme; ovules 3–5: fr. about 1 cm. long, with distinct style. W. China. Intr. 1910. Zone VI?—**B. yunnanénsis** Franch. Brts. reddish, slightly grooved: lvs. obovate-oblong, usually entire, slightly reticulate beneath: fls. 3–8; ovules 3–5: fr. 1–1.2 cm. long, with a very short style or without. W. China. Intr. 1910. Zone VII?—**B. Faxoniàna** Schneid. Brts. slightly angled, often reddish: lvs. obovate-oblong, 1.5–3 cm. long, with 4–10 spreading teeth on each side: infl. 2–6-fld.: fr. ellipsoid, purple, with a very short style. Origin unknown, probably intr. from W. China before 1900. Zone V.—**B. consímilis** Schneid. Brts. grooved, yellowish brown, gray when older: lvs. obovate-oblong, 1.5–2 cm. long, spinulose-dentate: infl. 3–8-fld.; ovules usually 4: fr. ellipsoid, purple; stigma sessile. Origin unknown, cult. since 1904.

18. **B. circumserràta** Schneid. Upright shrub to 1 m.; brts. grooved, yellowish or slightly reddish; spines 1–5-parted, to 2.5 cm. long: lvs. obovate to obovate-oblong, 1.5–3.5 cm. long, rounded at apex, cuneate at base, densely spinulose-serrate, those of the shoots sometimes nearly entire, reticulate and whitish beneath: infl. 1–3-fld.; peduncle to 2.5 cm. long; fls. yellow, 1 cm. across; ovules usually 4: fr. ellipsoid-oblong, 1.3–1.5 cm. long including the distinct style, yellowish red. N. W. China. Intr. 1911. Zone V.—Handsome shrub similar to *B. diaphana*, but the leaves densely serrulate.

19. **B. angulòsa** Wall. Upright shrub to 1.5 m.: brts. grooved, puberulous; spines 1–5-parted to 1.5 cm. long: lvs. obovate to oblong-obovate, 1.5–3.5 cm. long, with 1–3 spiny teeth on each side or entire, slightly revolute, whitish beneath: fls. solitary, globose, 1.5 cm. across, orange-yellow, on stalks 1–2.5 cm. long, or in short 2–4-fld. racemes: fr. ellipsoid, 1.5 cm. long, red. B.M. 7071(c). Himal. Intr. about 1850. Zone VI?—Handsome barberry with rather large flowers and fruits.

Group 6. Polyanthae Schneid. Lvs. deciduous or half-evergreen: infl. paniculate, sometimes reduced to a short and dense raceme: fr. red; ovules 2–5; style distinct.

20. **B. Wilsònae** Hemsl. & Wils. Deciduous or half-evergreen shrub: brts. with very short internodes, angled, puberulous at first, yellowish or brownish red, brown or grayish brown the second year; spines 3-parted, slender, 1–2 cm. long: lvs. oblanceolate, 6–20 mm. long, obtuse or sometimes acutish and mucronulate, dull pale green above, glaucescent beneath, reticulate on both sides: fls. about 7 mm. across, golden yellow, in 3–many-fld. dense fascicles, or in short dense panicles not exceeding 1.5 cm.; pedicels 2–4 mm. long: fr. subglobose, 5–6 mm. long, salmon- or coral-red, often paler

on one side, with short distinct style. B.M.8414(c). Gs.1:180,t(c),185. G.C.III.42:372. Gn.89:537. R.H.1920:9(h). W. China. Intr. 1903. Zone (V) VI.—Var. **Stapfiàna** Schneid. Brts. glabrous: lvs. oblanceolate to obovate-oblong, mucronulate: infl. 4–7-fld.: fr. ellipsoid. B.M.8701(c). (*B. Stapfiana* Schneid.) W. China. Cult. 1894. Zone VII?—Var. **subcaulialàta** Schneid. Brts. glabrous, strongly angled: lvs. obovate to oblong-obovate, occasionally with 1 or few teeth near the apex, whitish beneath: infl. 6–8-fld. R.H.1920:29(h). G.C.III.79:24. Gn.85:501. (*B. s.* Schneid., *B. Coryi* Veitch.) W. China. Intr. 1894. Zone VII?—Probably "Tom Thumb," a dwarf dense form, is a var. of this species. Gn.87:555(h).—Low, densely branched, very spiny shrub, sometimes prostrate, with small lvs. assuming brilliant autumnal tints and with profusely produced light red berries.

B. W. × ? *aggregata* = **B. rubrostílla** Chittenden. Lvs. obovate-spatulate, 1–2 cm. long, entire and partly spiny-toothed; fr. ovoid, scarlet, about 1.5 cm. long, in pendulous few-fld. panicles or racemes, to 2 cm. long. G.C.III.60:236. Gn.80:563;85:580. J.L.42:f.65. Orig. before 1916.—Here belong probably: "Comet" with ovoid coral-red frs. in dense, profusely produced clusters. G.C.III 75:59. Gn.87:578.—"Autumn Beauty" with coral-red frs. in short panicles. G.C.III.74:209.—"Lady Beatrice Stanley" with subglobose coral-red frs. in short, dense, pendulous panicles. G.C.III.72:283. Gn.86:569.—Other named forms see Gn.85:566, 567, 581.

21. **B. parvifòlia** Sprague. Low shrub; brts. strongly angled, puberulous, dull brown the second year; spines 3-parted, yellow, slender, 8–15 mm. long: lvs. obovate-oblong to obovate, 5–15 mm. long, remotely spiny-dentate or sometimes entire, glaucescent beneath: fls. about 6 mm. across, in short and dense, 2–10-fld. clusters; pedicels 2–5 mm. long; ovules 2–4: fr. broad-ellipsoid, 6 mm. long, red, bloomy, with distinct style. W. China. Cult. 1896. Zone V. —Low shrub similar to *B. Wilsonae* but with smaller and broader lvs.

22. **B. aggregàta** Schneid. Shrub to 3 m.; brts. strongly angled, puberulous, grayish brown the second year; spines 3-parted, slender, 1–2 cm. long: lvs. obovate to obovate-oblong, 1–2.5 cm. long, spinulose-serrate or sometimes sparingly spiny-toothed, rarely entire, reticulate and glaucescent beneath: fls. pale yellow, about 6 mm. across, in sessile dense panicles 1–4 cm. long; pedicels 1–3 mm. long: fr. globose-ovoid, 5–6 mm. long, red, bloomy, with distinct style. Gn.88:645. M.G.32:82(fr.),83(h). (*B. Geraldii* Veitch.) W. China. Intr. 1908. Zone V.—Var. **Práttii** Schneid. Lvs. to 3.5 cm. long, usually obovate, often entire: panicles 3–6 cm. long, subsessile, or to 10 cm. long and peduncled. B.M.8549(c). S.L.118(h). (*B. P.* Schneid.) W. China. Intr. 1904. Zone V.—Var. **recurvàta** Schneid. Lvs. usually oblong-obovate, often entire: panicles, including the 1.5–3.5 cm. long stalk, 4.5–10 cm. long, cylindric, its lower brts. very short, 2–4-fld.; pedicels recurved in fr.: fr. subglobose, about 5 mm. long, scarlet. W. China. Intr. 1908. Zone V.—Densely branched shrub, very handsome in fr.

B. a. ? × *Wilsonae* = *B. rubrostilla;* see under No. 20.

23. **B. polyántha** Hemsl. Upright shrub to 4 m.; brts. angled, glabrous or slightly puberulous, grayish brown or dull brown the second year; spines solitary or 3-parted, 1–2 cm. long: lvs. obovate or broad-obovate, 1.5–3 cm. long, rounded at apex, spiny-dentate, rarely entire, dull green above, glaucescent or glaucous below, reticulate on both sides, fls. deep yellow, about 1 cm. across, in pendulous much-branched panicles 5–12 cm. long; pedicels 1–5 mm. long: fr. oblong-ovoid, narrowed into a distinct style, 7–8 mm. long, 3–4 mm. thick, salmon red. Gn.84:583. G.C.III.72:263. W. China. Intr. 1904. Zone VI?—Very distinct and handsome in bloom with its large and abundant panicles of deep yellow fls.

Group 7. TINCTORIAE Schneid. Lvs. deciduous or half-evergreen, usually obovate-oblong or obovate-lanceolate: fls. in umbel-like or simple racemes or in panicles; ovules 1–4, style usually distinct.

24. **B. aristàta** DC. Deciduous shrub to 3 m.; brts. nearly terete, gray or yellowish brown the second year: spines simple or 3-parted, to 3 cm. long: lvs. obovate-elliptic or obovate to obovate-oblong, 2.5–6 cm. long, acute or obtuse, spiny-dentate or sometimes entire, light green or whitish beneath and slightly reticulate, chartaceous at maturity: fls. bright yellow, often reddish outside, in 10–25-fld. racemes 5–10 cm. long: fr. oblong, about 1 cm. long, red or finally purple, bloomy, with short style; pedicels shorter or as long as the fruit. Bentley & Trimen, Med. Pl.1:t.16(c). B.S.1:235. N. W. Himal. Intr. about 1820. Zone V.—Var. **coriària** Schneid. Young brts. grooved. B.R.27:46(c). (*B. c.* Royle, *B. aristata* var. *floribunda* Bean, partly.) N. W. Himal. Intr. 1835.—Vigorous widespreading shrub, conspicuous when in bloom or in fruit.

B. a. × *vulgaris* = **B. macracántha** Schrad. Tall shrub to 4 m.; brts. grooved or nearly terete, usually yellowish gray the second year; spines to 3 cm. long; lvs. usually obovate, remotely spinulose-serrate; racemes long, 10–20-fld.; fr. ellipsoid, purple; style short or wanting; the lower pedicels longer than the fruits. Origin, about 1830.

25. **B. chítria** Lindl. Deciduous or half-evergreen shrub, to 3 m. or occasionally to 6 m.; young brts. terete, or slightly grooved, puberulous, yellowish gray to reddish brown the second year; spines usually simple, to 3 cm. long: lvs. obovate or elliptic to obovate-lanceolate, 2.5–8 cm. long, acute or acutish, entire or with 1–5 teeth on each side, bright green beneath, slightly reticulate on both sides: infl. paniculate, pendulous, many-fld., peduncled; pedicels 5–10 mm. long; fls. pale yellow, about 1 cm. across; ovules 4–5, stipitate: fr. elliptic-oblong, 1.2 cm. long, dark red or purple, bloomy, with distinct style. B.R.9:729(c). B.M.2549(c). (*B. aristata* Hook., not DC.) Himal. Intr. 1820. Zone VIII?

B. ? *c.* × ? = **B. Spaèthii** Schneid. Brts. subterete, glabrous: lvs. elliptic to ovate-oblong or obovate, spinulose-serrate, light green or grayish beneath: infl. paniculate or racemose: fr. purple, bloomy, with very short style. Origin unknown; cult. 1902.

26. **B. Francísci-Ferdinándi** Schneid. Shrub to 3 m.; brts. nearly terete or slightly angled, purplish when young, red-brown the second year; spines usually simple, to 2.5 cm. long: lvs. ovate to ovate-lanceolate, 2–7 cm. long, spiny-dentate, rarely nearly entire, green beneath and somewhat lustrous, slightly reticulate; petioles 5–15 mm. long: fls. about 8 mm. across, in pendulous peduncled panicles 5–12 cm. long; pedicels to 1 cm. long; ovules 2, subsessile; fr. ellipsoid, 1.2 cm. long, scarlet, with a very short style. W. China. Intr. 1900. Zone V.—Handsome shrub, particularly striking with its drooping panicles of scarlet frs.

Into this group belong also the following species:

B. Beaniàna Schneid. Brts. slightly angled, reddish while young, gray when older; spines 3-parted, to 2 cm. long; lvs. elliptic-lanceolate, acute, 2–4 cm. long, spiny-dentate, whitish beneath: fls. 6 mm. across, in 10–20-fld. panicles to 4 cm. long; ovules 3–4, subsessile: fr. about 1 cm. long, purple, bloomy; stigma sessile. G.C.III.72:351. Gn.83:591. (*B. Veitchii* Hort. Veitch.) W. China. Intr. 1904. Zone VI?—**B. Potanìni** Maxim. Brts. grooved, purple; spines simple or 3-parted, to 4 cm. long: lvs. lanceolate to obovate-oblong or ovate, 2–6 cm. long, with 1–4 spiny teeth on each side, rarely entire, pale or white beneath: racemes to 3.5 cm. long, the lower pedicels sometimes 2-fld.; ovules 2: fr. subglobose, about 9 mm. long, red, with short style. (*B. Liechtensteinii* Schneid.) W. China. Intr. 1910. Zone VI?—Remarkable for its long spines.—**B. umbellàta** Wall. Brts. grooved, reddish brown: lvs. obovate to obovate-oblong, 1.5–3 cm. long, obtuse or acute, with few spreading teeth or entire: racemes umbel-like, long-peduncled, few-

fld.: fr. ovoid, 1 cm. long, red; stigma sessile. Himal. Intr. about 1850. Zone VII. Doubtful if now in cult.

Group 8. Asiaticae Schneid. Lvs. evergreen or half-evergreen, pale green or whitish and papillose beneath: fls. in racemes or fascicles; ovules 3–5, sessile; style short.

27. **B. lýcium** Royle. Half-evergreen shrub to 3 m.; brts. terete, puberulous, yellowish gray, gray the second year; spines 3-parted, to 2 cm. long: lvs. oblanceolate to obovate-lanceolate, 2–5 cm. long, acute or obtuse and mucronulate, entire or with few teeth, light green above, glaucescent and papillose beneath: fls. bright yellow, in 10–20-fld. racemes, usually elongated, sometimes paniculate, to 10 cm. long, rarely short and umbel-like; pedicels to 2 cm. long: fr. ellipsoid, 8–12 mm. long, purple, bloomy, with distinct style. B.M.7075(c). (*B. ruscifolia* Lav., not Lam., *B. elegans* Hort.) Himal.: Kashmir to Nepal. Intr. about 1850. Zone VIII.

The related **B. asiática** Roxb. with evergreen lvs. and short corymbose racemes is probably not hardy within our area.

Group 9. Integerrimae Schneid. Lvs. deciduous, petioled, lanceolate to broad-obovate, entire or serrate, usually grayish green and reticulate on both sides: racemes elongated, dense, spike-like; ovules 2–4, subsessile or short-stipitate: fr. red; stigma sessile.

28. **B. nummulária** Bge. Shrub to 3 m. tall; brts. terete, purple and bloomy when young, purplish brown the second year; spines usually simple, 1–3 cm. long: lvs. oblong-obovate to oblanceolate, 2–4 cm. long, obtuse or acutish, gradually narrowed into a petiole 5–15 mm. long, entire or rarely with a few teeth, glaucescent and reticulate on both sides, subchartaceous; fls. yellow, 5–6 mm. across, in dense many-fld. racemes 3–5 cm. long; ovules 2–3; pedicels 3–6 mm. long in fr.: fr. globose-ovoid, 5–6 mm. long, red or pale red. Turkest., N. Persia. Intr. before 1878. Zone V.—The form described above has been distinguished as var. **pyrocárpa** Schneid. (*B. integerrima* var. *pyrocarpa* Reg.); the typical form differs in its broad-obovate lvs. S.H.1:f.198p-q.—Tall spreading shrub with pale bluish green lvs.

29. **B. turcománica** Karelin. Shrub to 3 m.; brts. nearly terete or slightly grooved, usually purple and bloomy while young, purplish brown the second year; spines simple or 3-parted, 1–2.5 cm. long: lvs. very unequal, petioled, obovate-oblong, 2.5–4 cm. long, obtuse, narrowed at base into a petiole 1–2.5 cm. long, entire or sparingly spinulose-serrate, glaucescent on both sides and reticulate: fls. bright yellow, about 8 mm. across, in 12–25-fld., usually rather dense racemes 4–7 cm. long; ovules 3–4, subsessile; pedicels to 1 cm. long: fr. ellipsoid, to 9 mm. long, dark red, bloomy. S.H.1:f.198r-v′. Turkest. and N. Persia to Armenia. Cult. 1880. Zone V.—Var. **integerrima** Schneid. (*B. i.* Bge.) has the lvs. papillose beneath, while the typical form has no papillae like the following var.—Var. **densiflòra** Schneid. Racemes denser; pedicels to 6 mm. long. Nouv. Mem. Soc. Nat. Mosc. 12:t.3,f.2. (*B. d.* Boiss. & Buhse, *B. integerrima* var. *serratifolia* Boiss.) N. Persia. Intr. before 1906. Zone V.—Tall shrub with spreading brs. and bluish green lvs.

30. **B. Vérnae** Schneid. Shrub to 2 m.; brts. grooved, purplish; spines usually simple and short, sometimes to 3 cm. long: lvs. very unequal, spatulate to oblanceolate, 1–2.5 cm. long, rarely to 4 cm. long, obtuse, rarely acute, nearly always entire, green and slightly reticulate on both sides: fls. yellow, 3–4 mm. across, in dense racemes with the short peduncle 1.5–4 cm. long; pedicels 2–3 mm. long; ovules 2, sessile: fr. globose, about 5 mm. across, red. B.M.9089(c). M.G.32:82. (*B. Caroli* var. *hoanghensis* Schneid.) N. W. China. Intr. 1910. Zone V.—Very distinct and graceful spreading shrub with slender brs. and very dense racemes of small fls.

Group 10. HETEROPODAE Schneid. Lvs. deciduous, petioled, usually entire: fls. in fascicles or in umbel-like or elongated racemes, sometimes compound at base: ovules 2–6, stipitate: fr. bluish black.

31. **B. heterópoda** Schrenk. Shrub to 2 m.; brts. terete, brown, lustrous, grayish brown the second year; spines simple or 3-parted, to 2.5 cm. long, sometimes wanting: lvs. broad-ovate to obovate or elliptic, 2–5 cm. long, obtuse, abruptly contracted at base into a petiole to 2 cm. long, entire or finely serrate, grayish green above, glaucous beneath, slightly reticulate on both sides: fls. orange-yellow, fragrant, 1.2 cm. across, in short, 3–8-fld. umbel- or fascicle-like racemes; pedicels to 1.5 cm. long; ovules 4–6, long-stipitate: fr. subglobose or ovoid, about 1 cm. long, black, bloomy; stigma sessile; seeds usually 3. G.F.8:455. B.C.1:591. Turkest. Intr. 1876. Zone V.—Spreading shrub distinct on account of its bluish green lvs. and the large fragrant fls.

B. h. × ? *vulgaris* = **B. notàbilis** Schneid. Tall upright shrub; brts. slightly grooved, grayish brown while young: lvs. obovate to obovate-oblong, nearly always serrate: racemes elongated, 14–20-fld.: fls. smaller: fr. elliptic-ovoid, dark red, bloomy. Orig. 1895.

32. **B. oblónga** Schneid. Shrub to 2 m. or more; brts. terete or slightly grooved, chestnut-brown, lustrous, little changing the second year; spines simple or 3-parted, 5–15 mm. long: lvs. very unequal, obovate-oblong to elliptic, 2–5.5 cm. long, obtuse, abruptly contracted at base, entire or remotely serrulate, grayish green above, glaucescent beneath, slightly reticulate on both sides; fls. yellow, about 1 cm. across, in 10–20- or occasionally to 50-fld. panicles; pedicels 6–10 mm. long; ovules 2–3, short-stipitate: fr. ellipsoid, about 1 cm. long, purplish black, bloomy, with a very short style; seed usually 1. (*B. heteropoda* var. *o.* Reg.) Turkest. Intr. about 1874. Zone V.—Similar to the preceding species, but handsomer on account of its larger infl.

Group 11. TSCHONOSKYANAE Schneid. Similar to the preceding group, but fr. red and ovules 2, subsessile.

33. **B. Silva-Taroucàna** Schneid. Shrub to 3 m.; brts. grooved, reddish brown, older grayish; spines usually simple, small or wanting: lvs. obovate-obiong to oblong-lanceolate, 1.5–5.5 cm. long, obtuse, usually contracted at base into a petiole to 2 cm. long, entire or remotely serrate, green above, pale and pruinose beneath, slightly reticulate on both sides: fls. yellow, about 8 mm. across, in 8–12-fld. racemes 3–7 cm. long; pedicels 1–2 cm. long: fr. globose-ovoid, to 1 cm. long, scarlet; stigma sessile. W. China. Intr. 1908. Zone V.

A closely related species is **B. Mouillacàna** Schneid. which differs chiefly in the lvs. being lustrous green beneath and in the purplish brown brts.: pedicels 5–13 mm. long. W. China. Intr. 1908. Zone V.

Group 12. SINENSES Schneid. Brts. more or less purplish or red-brown the second year: lvs. deciduous, lanceolate to obovate, usually entire or remotely toothed: fls. in racemes, sometimes short, fascicle-like, rarely solitary; ovules 1–2; fr. usually red; stigma sessile.

34. **B. Thunbérgii** DC. Much-branched shrub to 2.5 m.; brts. strongly grooved, yellowish or purplish red, purple-brown the second year; spines usually simple, 5–18 mm. long: lvs. very unequal, obovate to spatulate-oblong, 1–3 cm. long, obtuse, rarely acute, narrowed at base into a petiole 2–10 mm. long, quite entire, bright green above, glaucescent beneath: fls. yellow, reddish outside, 8–10 mm. across, solitary or 2–5 and fascicled or umbellate and peduncled; pedicels 6–10 mm. long: fr. ellipsoid, about 1 cm. long, bright red. B.M.6646(c). G.F.2:53. A.F.8:526(h). (*B. sinensis* K. Koch, not Desf., *B. japonica* Hort.) Japan. Intr. about 1864. Zone V.—

Var. **Maximowíczii** Reg. Lvs. usually acute, green beneath.—Var. **argenteo-marginàta** Schneid. Lvs. variegated with white. G.C.III.49:10(as "Silver Beauty").—Var. **mínor** Rehd. Low dense form, scarcely exceeding 0.5 m.: lvs. about 1 cm. or less long. M.G.32:90(h). S.L.115(h). (Var. *Dawsonii* Bean.) Orig. before 1900.—Var. **pluriflòra** Koehne. Infl. umbellate, 5–10 fld.—Much-branched broad and spreading shrub with bright green lvs. turning brilliant scarlet in autumn and with bright red lustrous frs. remaining almost unchanged until the following spring. One of the best ornamental shrubs, much used for hedges.

B. T. × *vulgaris* = **B. ottawénsis** Schneid. It differs chiefly in the 5–many-fld. umbellate or sometimes racemose infl., in the often serrulate lvs. and in the yellowish brown, rarely purplish brts.; from *B. vulgaris* it may be distinguished by the color of the brts., by the obovate often entire lvs. usually not exceeding 3 cm., and by the shorter, usually umbellate infl. Cult. 1889.—Var. **purpúrea** Schneid. Lvs. purple or purplish.

35. **B. virèscens** Hook. Shrub to 3 m. with slender upright brs.; brts. terete, lustrous red-brown the second year; spines simple or 3-parted, slender, 1–2 cm. long: lvs. obovate to obovate-oblong, 1.5–3 cm. long, rounded or mucronate at apex, remotely toothed or entire, bright green above, glaucous beneath: fls. pale yellow, in few-fld. peduncled, usually umbel-like racemes; pedicels slender, about 1 cm. long: fr. oblong, about 1 cm. long, purple, bloomy. B.M.7116(c). Sikkim-Himal. Intr. about 1850. Zone V.—Var. **macrocárpa** Bean. Fr. larger, nearly black.—A handsome upright growing shrub with slender shining brown brs.

A related species is **B. oritrépha** Schneid. Brts. brighter red; spines stouter and longer: lvs. more reticulate, partly setose-serrate, glaucescent beneath: umbel-like racemes 3–6-fld., often subsessile. N. China. Intr. 1911. Zone V.

36. **B. Poirétii** Schneid. Shrub to 2 m.: brts. slender, grooved, purplish brown; spines small, usually simple, about 5 mm. long; lvs. oblanceolate to narrow-oblanceolate or lanceolate-spatulate, 1.5–4 cm. long, acute and mucronulate, cuneate at base, entire, bright green above, light or grayish green beneath, slightly reticulate: fls. bright yellow, reddish outside, about 6 mm. across, in peduncled, 8–15-fld. racemes: pedicels in fr. about 5 mm. long; bracts 2.5–3.5 mm. long: fr. ovoid-oblong, about 1 cm. long, bright red. B.S.1:248. (*B. sinensis* DC., partly, not Desf., *B. sinensis* var. *angustifolia* Reg.) N. China, Amurl. Intr. about 1860. Zone IV or V.—Handsome shrub with spreading brs., bright green narrow lvs. and dense racemes of bright yellow fls.

B. ? *P.* × *canadensis* = **B. durobrivénsis** Schneid. with reddish brown brts., small spines, serrulate lvs. obovate-oblong to oblanceolate and the racemes often with longer stalked fls. at the base. Orig. before 1906.

The following closely related species are known to be in cult.; both differ in having the bracts much shorter than the pedicels:

B. Boschànii Schneid. Spines to 1.8 cm. long: lvs. obovate, 1–2 cm. long: fr. ellipsoid, about 5 mm. long, coral-red. W. China. Intr. 1908. Zone VI?—**B. thibética** Schneid. Brts. slightly angled; spines to 2.5 cm. long: lvs. obovate-oblong, 1–2.5 cm. long, entire or with few teeth: fr. ellipsoid, about 1 cm. long, red, with short style. W. China. Intr. 1903. Zone V or VI.

37. **B. chinénsis** Poir. Shrub to 3 m.; brts. grooved, purple- or red-brown; spines simple or 3-parted, 5–18 mm. long: lvs. oblanceolate to obovate-lanceolate, 1.5–4 cm. long, acute or obtusish, entire or with few teeth, bright green above, pale green or slightly glaucescent beneath, slightly reticulate on both sides: fls. 6–8 mm. across, in peduncled, 10–12-fld. racemes to 7 cm. long; pedicels in fr. 7–15 mm. long, much longer than the bracts: fr. ellipsoid to elliptic-oblong, about 1 cm. long, dark red and often bloomy. B.M.6573(c). G.O.t.63(c, as *B. canadensis*). (*B. sinensis* Desf., *B. spathulata* Schrad., *B.*

Guimpeli Koch & Bouché, *B. serotina* Lge.) Caucas. Cult. 1808. Zone V.—Graceful shrub similar to the preceding, but with somewhat broader leaves.

B. ? *c.* × *vulgaris* = **B. laxiflòra** Schrad. Brts. grayish brown the first, grayish the second year: lvs. obovate-oblong, 2–5 cm. long, remotely serrulate or sometimes entire: racemes 4–9 cm. long, usually nearly sessile. Orig. before 1838.—Var. **oblanceolàta** Schneid. Lvs. oblanceolate, rather densely serrulate. Orig. unknown; before 1880.—Var. **Langeàna** Schneid. Brts. purplish brown, grayish brown the second year: lvs. obovate-oblong, 2–6 cm. long, remotely dentate. (*B. Guimpeli* Hort., not Koch.) Orig. unknown.—*B.* ? *c.* × *amurensis* = **B. Meehànii** Schneid. Brts. angled, grayish brown or brownish, grayish the second year; spines usually simple, to 2 cm. long: lvs. obovate to elliptic, 2.5–4 cm. long, densely serrulate, reticulate beneath: racemes 4–9 cm. long: fr. ellipsoid, red, slightly pruinose. Orig. unknown (distributed by Meehan as *B. concinna*).

Related species but rarely cult. are the following:

B. crataégina DC. Young brts. nearly terete, brown, grayish the second year; spines usually simple: lvs. oblong-ovate to oblanceolate, 1–4 cm. long, entire or with few teeth: racemes 6–20-fld.: fr. ellipsoid, purple-black. S.H.1:f.197r-t. Asia Minor. Intr. 1835, but doubtful if now in cult. Zone V.—**B. crètica** L. Much-branched shrub, sometimes procumbent; brts. nearly terete, purplish; spines usually 3-parted, 5–20 mm. long: lvs. oblanceolate to obovate-oblong, 8–15 mm. long, obtuse or acutish, entire, slightly reticulate: fls. in 2–7-fld. fascicles or short racemes: fr. purple-black, with short style. S.F.9:t.342(c). S.H.1:f.194d-f. Greece. Intr. 1703. Zone VII or VIII?

38. **B. canadénsis** Mill. Upright shrub to 2 m.; brts. brown to dull purple, slightly angled, grayish the second year; spines usually 3-parted, to 1.2 cm. long: lvs. obovate to obovate-oblong, 2–5 cm. long, usually obtuse, remotely spinulose, grayish white beneath, with indistinct veins, firm at maturity: fls. bright yellow, in 5–15-fld. racemes 2–4.5 cm. long; pedicels 5–10 mm. long: fr. ellipsoid to short-ellipsoid, 7–9 mm. long, scarlet. Gr.G.1:t.31. G.W.1: 101,t(c). B.B.2:127. (*B. pisifera* Raf., *B. caroliniana* Loud., *B. angulizans* Massias.) Va. to Ga. and Mo. Cult. 1730. Zone V.—Shrub with slender upright brs.; lvs. turning scarlet in autumn and the bright frs. remaining a long time unchanged on the brs. Often *B. vulgaris* is cult. under the name of *B. canadensis.*

B. ? *c.* × *vulgaris* = **B. declinàta** Schrad. Brts. yellowish or brownish, tinged violet, brownish gray the second year: lvs. obovate-oblong to elliptic-obovate, remotely serrate or subentire, grayish beneath: racemes often umbel-like, usually peduncled, 3–5 cm. long; pedicels partly whorled, 5–7 mm., the lower to 1 cm. long: fr. elliptic-oblong, about 1 cm. long, blood-red. Orig. before 1830.—Var. **oxyphýlla** Schneid. differs chiefly in the acute, densely serrulate lvs. Origin unknown, possibly a hybrid of *B. canadensis* and *B. amurensis.*—*B.* ? *c.* × *Fendleri* = **B. Rehderiàna** Schneid. Brts. slender, red-brown, slightly angled; spines 3–5-parted: lvs. obovate to oblong-obovate, 2–3 cm. long, spiny-dentate: racemes peduncled, 8–15-fld.: fr. subglobose, 5–6 mm. across, bright red, lustrous, persisting nearly unchanged through the winter. Orig. about 1880. Zone V.—*B. c.* × *Poiretii* = *B. durobrivensis;* see under No. 36.

39. **B. Féndleri** Gray. Shrub to 1.5 m.; brts. slender, red-brown, lustrous, nearly terete; spines 3–5-parted, to 1.2 cm. long: lvs obovate-lanceolate to obovate-oblong, 2–3.5 cm. long, acute, entire or remotely spinulose, lustrous above, green and reticulate beneath: fls. bright yellow, tinged red outside, in short 6–10-fld. slender-peduncled racemes; pedicels 4–6 mm. long: fr. short-ellipsoid, 5–6 mm. long, bright red, lustrous. Clements, Rocky Mtn. Fl. t.4,f.3. S.H.1:f.197h-l. Colo. to N. Mex. Intr. before 1880. Zone (V), VI. —Small upright shrub, particularly handsome in autumn with its bright red lustrous fr. and its lvs. changing to scarlet.

B. ? *F.* × *canadensis* = *B. Rehderiana;* see under No. 38.

40. **B. Sieböldii** Miq. Shrub to 1.5 m.; brts. angled, two-edged toward the end, slender, red-brown the second year; spines slender, 3-parted, to 1.2 cm. long: lvs. oblong-obovate, 2.5–6 cm. long, obtuse or acutish, densely ciliate-

serrulate, green beneath: fls. pale yellow, in 3–6-fld. peduncled, umbel-like racemes: fr. subglobose, 5–6 mm. long, bright red, lustrous. S.T.1:t.14. S.L.116(h). Japan. Intr. 1892. Zone V.—Very distinct species with the lvs. purplish when unfolding and marked with green veins, changing to vinous red in autumn; the frs. retain their bright color and their shape until spring.

41. **B. Bretschneìderi** Rehd. Spreading shrub, to 4 m.; brts. nearly terete or slightly grooved, reddish brown the second year; spines simple or 3-parted, 5–15 mm. long: lvs. obovate-elliptic to obovate-oblong, 3–8 cm. long, usually obtuse, attenuate at base, densely setose-serrate, light green or slightly glaucescent beneath and reticulate: racemes peduncled, 2.5–4 cm., rarely to 5 cm. long, 10–15-fld.; pedicels 6–10 mm. long: fr. ellipsoid, 1–1.2 cm. long, purple, slightly bloomy. S.T.2:t.110. Japan (not N. China). Intr. 1892. Zone V.—Tall wide-spreading shrub similar to *B. vulgaris* but with red-brown, nearly terete brts. and paler fls. in shorter racemes.

42. **B. koreàna** Palib. Shrub to 2 m.; brts. grooved, reddish and bloomy, dark brown the second year; spines usually simple, 5–10 mm. long: lvs. obovate or elliptic, 2.5–7 cm. long, rounded at apex, cuneate at base, rather densely spinulose-serrulate, paler and reticulate beneath, subchartaceous at maturity: racemes rather short and dense, without the slender peduncle 2–3.5 cm. long; pedicels 4–6 mm. long: fr. globose-ovoid, about 6 mm. long, bright red. J.C.26,1:t.5. Gn.88:645. M.G.32:92(h),93. Korea. Intr. 1905. Zone V.—Upright shrub with rather stout brs. and broad bright green lvs. changing to deep red in autumn; the frs. retain their bright color a long time.

43. **B. Henryàna** Schneid. Shrub to 2 or 3 m.; brts. slightly angled, yellow or dark brown, the second year; spines simple or 3-parted, to 3 cm. long: lvs. petioled, elliptic to broad-obovate-oblong, 2–5 cm. long, usually obtuse, entire or with few teeth to spinulose-dentate, grayish green and bloomy beneath, slightly reticulate; petioles, 3–12 mm. long: racemes peduncled, 2.5–6 cm. long, 10–20-fld.; pedicels 6–9 mm. long; fls. 9–10 mm. across: fr. ellipsoid, 9 mm. long, blood-red, slightly bloomy. C. China. Intr. 1907. Zone V.—Shrub with slender brs., similar to *B. vulgaris*.

A closely related species is **B. Dielsiàna** Fedde; it differs chiefly in the narrower, acute lvs., greener beneath, in the longer raceme sometimes compound at base, and in the more brightly colored frs. W. China. Intr. 1910. Zone V.

Group 13. Dasystachyae Schneid. Lvs. usually long-petioled and rounded at base, broad, serrulate: racemes erect dense; ovules 1–2: fr. red; stigma sessile.

44. **B. dasystáchya** Maxim. Upright shrub to 4 m.; brts. reddish or light brown, terete or slightly angular, red-brown the second year; spines usually simple, 5–15 mm. long, rarely to 3 cm.: lvs. long-petioled, suborbicular or broad-ovate to broad-elliptic, 3–5 cm. long, obtuse, usually rounded at base, ciliate-serrate, glaucescent beneath; petiole 1–3 cm. long: racemes upright, slender, with the peduncle 5–6 cm. long; pedicels about 5 mm. long; peduncle 1–1.5 cm. long; fls. about 6 mm. across: fr. ellipsoid, 6–7 mm. long, coral-red. Maximowicz, Fl. Tangut. t.7,f.1–7. S.H.2:f.573f,574l. C. and N. W. China. Intr. 1893. Zone V.—Upright shrub, distinct on account of its broad, long-petioled lvs. similar to those of *B. heteropoda*, but bright green.

A closely related species is **B. kansuénsis** Schneid. Brts. bright red, slender: lvs. more remotely and less setosely serrate, those at base of infl. broad, often suborbicular, subsessile, usually entire: fls. about 8 mm. across: pedicels 3–10 mm. long. G.C.III.79:325. N. W. China. Intr. 1910. Zone V?

Group 14. Brachypodae Schneid. Lvs. and usually the infl. pubescent: racemes dense, spike-like.

45. **B. Gilgiàna** Fedde. Shrub to 2 m.; brts. grooved, slightly pubescent, yellow or purplish brown, red-brown the second year; spines usually 3-parted, 5–25 mm. long: lvs. elliptic or elliptic-obovate to oblong, 2.5–4.5 cm. long, acute, attenuate at base, remotely serrate, dull green and slightly pubescent or glabrous above, grayish green and pubescent beneath: fls. about 6 mm. across, bright yellow, in dense racemes 2.5–3.5 cm. long, on slender puberulous peduncles 1.5–2 cm. long; pedicels 1–3 mm. long; bracts shorter: fr. oblong-obovoid, 8–10 mm. long, deep blood-red, slightly bloomy. (*B. pubescens* Pampan.) N. C. China. Intr. 1910. Zone V.—Shrub with spreading brs. and handsome red fruit.

46. **B. brachýpoda** Maxim. Shrub to 2.5 m.; young brts. grooved, yellowish gray, pubescent; spines usually 3-parted, 1–2.5 cm. long: lvs. elliptic to oblong-obovate or oblong, 3–6 cm. long, acute, densely serrulate, pubescent on both sides, more densely beneath and green and reticulate: racemes spike-like, pubescent, without the 1–2 cm. long; peduncle 3–6 cm. long; pedicels 1–2 mm. long, its bracts longer; fls. pale yellow, about 1 cm. across: fr. elliptic-oblong, about 1 cm. long, deep blood-red, slightly bloomy. S.H.2:f.573g,574k. Gn.87:555. M.G.32:90. C. and N. W. China Intr. 1907. Zone V.—Spreading shrub, very distinct on account of its spike-like racemes of pale yellow flowers and large pubescent lvs.

47. **B. Giráldii** Hesse. Shrub to 2 m.; brts. slightly angled, glabrous, yellowish brown or dark brown; spines usually simple, sometimes to 2.5 cm. long: lvs. rhombic-ovate or oblong-ovate, 4–10 cm. long, acute, serrulate, dark green above and nearly glabrous, pubescent and bright green and reticulate beneath, reddish when unfolding: racemes spike-like, pendulous, to 10 cm. long including the peduncle, glabrous; pedicels 2–3 mm. long; fls. pale yellow, 9 mm. across: fr. ellipsoid, purple. M.D.1913:267. N. C. China. Intr. about 1900. Zone V.—Similar to the preceding species, but lvs. and racemes larger.

Group 15. Vulgares Schneid. Brts. yellowish gray or gray, grooved: lvs. deciduous, serrate or dentate: racemes usually long and many-fld., pendulous; ovules 2–3; stigma sessile: fr. red or purple, usually bloomy.

48. **B. amurénsis** Rupr. Shrub to 3.5 m.; brts. grooved, yellowish gray, gray the second year; spines usually 3-parted, 1–2 cm. long: lvs. elliptic to obovate-oblong, 3–8 cm. long, obtuse or acute, densely and irregularly setose-serrulate, reticulate and bright green, rarely glaucescent beneath: racemes to 10 cm. long, 10–25-fld., pendulous; pedicels 5–10 mm. long; fr. ellipsoid, about 1 cm. long, bright red, often bloomy. S.H.1:f.200k-m. (*B. vulgaris* var. *a.* Reg.) N. E. Asia. Intr. before 1860. Zone II.—Var. **japónica** Rehd. Lvs. broader, often rounded at apex, more densely serrulate and distinctly reticulate beneath: raceme shorter, 6–12-fld., slightly nodding. G.F.3:249. (*B. Regeliana* Koehne.) Japan, Korea. Intr. before 1880.—Tall shrub with the lvs. brighter green than those of *B. vulgaris* and habit more upright.

49. **B. vulgàris** L. Shrub to 2.5 or occasionally taller; brts. strongly grooved, yellowish or sometimes yellowish red while young, gray the second year; spines usually 3-parted, 1–2 cm. long: lvs. elliptic-obovate to obovate-oblong, 2–4 cm. long, obtuse, rarely acutish, attenuated into a petiole to 1 cm. long, greenish and slightly reticulate beneath: racemes short-stalked, 4–6 cm. long; pedicels 5–12 mm. long; fr. ellipsoid or elliptic-oblong, 8–12 mm. long, bright red or purple. E.B.1:t.51(c). R.I.3:f.4486(c). H.W.3:17, f.243. Eu., frequently naturalized in N. Am. Long cult. Zone III.—Var. **albo-variegàta** Zabel. Lvs. variegated with white.—Var. **argenteo-marginàta**

Usteri. Lvs. margined with white.—Var. **aureo-marginàta** Reg. Lvs. margined yellow.—Var. **atropurpúrea** Reg. Lvs. deeply purple (var. *purpurea* Bertin, not DC.). Gt.9:t.278,f.1(c).—Var. **lùtea** L'Hér. Fr. bright yellow.—Var. **alba** West. Fr. white or yellowish white. N.D.3:t.52(c). (Var. *leucocarpa* K. Koch.)—Var. **enúclea** West. Fr. without seeds. (Var. *asperma* Willd., var. *apyrena* Schrad.)—Var. **dúlcis** Loud. Fr. sweet or but slightly acid. (Var. *edulis* Jaeg.)—Upright shrub with the brs. at the top spreading and arching; much planted, but objectionable in wheat-growing regions, as it is the host of the aecidium-stage of the wheat-rust.

B. v. × *sibirica* = **B. emarginàta** Willd. Densely branched shrub to 1 m. or taller; brts. angled, yellowish or purplish, yellow-gray the second year; spines sometimes 5–7-parted: lvs. obovate-oblong to obovate-lanceolate, 1.5–4 cm. long, acute or obtuse, setosely serrulate, grayish beneath: racemes dense, 1–3.5 cm. long, 5–16-fld.; pedicels 5–8 mm. long; fls. 8–10 mm. across; petals emarginate; fr. ellipsoid, about 1 cm. long, deep red, slightly bloomy, sometimes with very short style. G.O.t.68(c). (*B. vulgaris* var. *e.* Gord.) Orig. unknown, about 1800. —Var. **britzénsis** Schneid. Young brts. brownish: lvs. more densely serrulate: racemes to 4 cm. long. Orig. unknown.—Probably also a hybrid with *B. sibirica*, but much nearer the latter species is **B. provinciàlis** Schrad. Brts. grooved, yellowish brown, grayish brown the second year; lvs. obovate-oblong to narrow-oblong, 1.2–2.5 cm. long, finely setose-serrulate, green and reticulate beneath: racemes 1–3 cm. long, sometimes subumbellate, 6–12-fld.; pedicels 3–6 mm. long, fls. 6–8 mm. across: fr. 8–9 mm. long, with sessile stigma. (*B. vulgaris* var. *p.* Audib.) Orig. before 1830.—Var. **serràta** Schneid. Low shrub; lvs. lanceolate or oblanceolate, 1–2 cm. long, acute, setose-serrulate with 6–10 teeth on each side, grayish green beneath and reticulate: fr. red, about 7 mm. long. (*B. s.* Koehne, *B. microphylla* var. *s.* Hort.)—*B. v.* × *Veitchii* = *B. Vanfleetii;* see under No. 9. —*B. v.* × *aristata* = *B. macracantha;* see under No. 24.—*B. v.* × *heteropoda* = *B. notabilis;* see under No. 31.—*B. v.* × *Thunbergii* = *B. ottawensis;* see under No. 34. —*B. v.* × *chinensis* = *B. laxiflora;* see under No. 37.—*B. v.* × *canadensis* = *B. declinata;* see under No. 38.—*B. v.* × *Mahonia aquifolium* = *Mahoberberis Neuberti;* see p. 234.

A closely related species is **B. aetnénsis** Presl. Dwarf shrub, to 0.5 m.; spines stout, to 3 cm. long: lvs. 1.5–3 cm. long, sometimes nearly entire: racemes 5–15-fld. (*B. vulgaris* var. *a.* Reg.) Moris, Fl. Sard.t.5. Corsica, Sardinia. Cult. 1894. Zone VII or VIII?

29. MENISPERMACEAE DC. MOONSEED FAMILY

Woody or suffruticose plants, mostly twining: lvs. alternate, usually palmately veined and often lobed: fls. dioecious, small, regular, usually in axillary racemes or fascicles, often panicled; sepals usually 6 in 2 whorls; petals 6, usually smaller than sepals, sometimes wanting; stamens usually 6, or more, free or connate; anthers 2- or 4-celled; carpels usually 3, each with 1 half-inverted ovule, developing into sessile or stipitate, much curved drupes with a usually sculptured bony or chartaceous endocarp; embryo usually curved; cotyledons flat or semiterete.—About 200 species in 63 genera, chiefly in the Tropics, in N. Am. n. to Man., none in Eu.

A. Lvs. not peltate, entire or lobed; stamens 6–12.
  B. Lvs. deeply cordate at base and deeply 5–7-lobed; sepals 9; petals 0: drupes 2.5 cm. long ..... 1. *Calycarpon*
  BB. Lvs. rounded or subcordate at base, entire or shallowly 3–7-lobed; sepals and petals 6: drupes 1 cm. or less long.
    C. Lvs. ovate to ovate-oblong, entire and obtuse or 3-lobed; fr. in clusters or spikes. 2. *Cocculus*
    CC. Lvs. broad-ovate, entire and acuminate or 5–7-lobed: stamens 9–12: fr. in pendulous panicles to 15 cm. long ..... 3. *Sinomenium*
AA. Lvs. peltate, sometimes slightly so, shallowly palmately 3–7-lobed: stamens 12–24; sepals 4–10; petals 6–9 ..... 4. *Menispermum*

1. **CALYCOCÁRPUM** Nutt. Twining deciduous shrub; lvs. long-petioled, palmately lobed: fls. greenish, in large panicles; sepals 9; petals wanting;

stamens 12; anthers 2-celled; pistillate fls. with 6 staminodes; carpels 3, with a short thick style: drupe ellipsoid or subglobose; stone deeply hollowed out on one side and erosely toothed on the margin of the cavity, convex and smooth on the other. (Greek *calyx*, cup, and *carpos*, fruit, referring to the cup-like stone.) One species.

C. Lyŏni Nutt. High climbing; glabrous or slightly pubescent: lvs. broad-ovate or orbicular in outline, 10–20 cm. long, broad-cordate at base, deeply palmately 3–7-lobed, with ovate to oblong, acute or acuminate, repand or entire lobes, bright green beneath: fls. in peduncled loose panicles 10–20 cm. long: drupe about 2.5 cm. long, black. Fl.v–vi; fr.viii. E.P.IV.94:129. Gr.G.1:t.30. B.B.2:130. Ill. to Kans., s. to Fla. and Tex. Intr. 1879 or before. Zone VI?—Strong growing vine with large leaves, but rare in cult.

2. **CÓCCULUS** DC. Twining or erect shrubs, deciduous or evergreen: lvs. entire or lobed: fls. in panicles or racemes; sepals and petals 6; stamens 6–9; anthers 4-celled; staminodes 6 or 0; carpels 3–6; style cylindric, with lateral stigma: drupes obovoid or subglobose; stone compressed, transversely ribbed. (Diminutive of Greek *kokkos*, berry.) Syn.: *Cebatha* Forsk., *Epibaterium* Forst. Eleven species in E. and S. Asia, Afr., Hawaii Isls., and N. Am.

A. Fr. red: petioles 1.5–4 cm. long: lvs. glabrous above: petals emarginate or entire at apex. 1. *C. carolinus*

AA. Fr. bluish black: petioles 1–2 cm. long; lvs. pubescent on both sides: petals bifid at the apex. 2. *C. trilobus*

1. **C. carolīnus** DC. Carolina Moonseed. Twining to 4 m.; brts. pubescent: lvs. orbicular- to triangular-ovate, 5–9 cm. long, obtuse and mucronulate at apex, rounded to subcordate at base, entire or shallowly 3–5-lobed, pubescent and glaucescent beneath: fls. in short or sometimes spike-like panicles to 10 cm. long: fr. red, 6–8 mm. long. Fl.vi–viii. Gr.G.1:t.28. S.H.1:327. (*Cebatha carolina* Brit., *Epibaterium carolinum* Brit.) Va. and Ill. to Fla. and Tex. Intr. 1759. Zone V, VI.

2. **C. trĭlobus** DC. Twining to 4 m.; brts. pubescent: lvs. usually ovate, sometimes ovate-oblong, 4–9 cm. long, obtuse and mucronate or acutish, rounded to cordate at base, entire or 3-lobed with the middle lobe usually elongated, pubescent on both sides: fls. in axillary cymes, sometimes forming an elongated terminal spike: frs. subglobose, 7 mm. across, black, bloomy, forming usually dense peduncled clusters. Fl.vi–viii; fr.x. B.M.8489(c). I.T.6:t.231. B.S.1:376. S.H.1:f.205k-n. (*C. Thunbergii* DC., *Cebatha orbiculata* Ktze.) Japan, China, Philipp. Isls. Intr. before 1870. Zone V.—Much-branched twining shrub keeping its lvs. green until late in autumn, attractive with its numerous bluish black frs.

3. **SINOMĒNIUM** Diels. Deciduous twining shrub: lvs. long-petioled and palmately lobed or entire: fls. inconspicuous, in large panicles; sepals 6; petals 6; stamens 9–12; anthers 4-celled; pistillate fls. with 9 staminodes; carpels 3; style recurved with lobulate stigma: drupe excentric; stone curved with a tubercled dorsal rib and numerous transverse ribs. (Sina, China, and Greek *men*, moon; meaning Chinese moonseed.) One species.

S. acŭtum Rehd. & Wils. Twining to 6 m.; brts. glabrous, striped: lvs. ovate, 6–15 cm. long, acuminate, rounded or cordate at base, entire or 3–7-lobed, usually with rather narrow elongated lobes, glabrous and dark green above, glaucescent and slightly pubescent beneath or nearly glabrous: fls. in panicles 10–20 cm. long: drupe compressed, 6–7 mm. across, bluish black. Fl.vi; fr.x. G.C.III.52:411. (*Menispermum a.* Thunb., *Cocculus diversifolius*

Miq., *C. heterophyllus* Hemsl. & Wils., *S. diversifolium* Diels.) Japan, C. China. Intr. 1901. Zone VI?—Var. **cinerascens** Rehd. & Wils. Lvs. pubescent above and densely grayish pubescent beneath. Intr. 1907.—Vigorous climber with large handsome foliage.

4. **MENISPÉRMUM** L. Moonseed. Twining suffruticose plants: lvs. long-petioled, peltate, 3–7-lobed: fls. small, in peduncled racemes or panicles, sepals 4–10; petals 6–9, suborbicular, shorter than the sepals, stamens 12–18, rarely 24; anthers 4-celled; pistillate fls. with 6–12 staminodes; carpels 2–4, with broad subsessile stigma: drupes 2–3; stone compressed, reniform or crescent-shaped, crested on back; endosperm copious; cotyledons semiterete, remaining enclosed in the seed. (Greek *men*, moon, and *sperma*, seed.) Two species in N. Am. and E. Asia.

A. Young growth pubescent: petiole attached just inside the margin.....1. *M. canadense*
AA. Young growth glabrous: lvs. distinctly peltate.....2. *M. dauricum*

1. **M. canadénse** L. Common M. Climbing to 4 m.; brts. finely pubescent when young; lvs. slender-petioled, orbicular-ovate, 10–20 cm. long, acute or obtuse, rounded or truncate at base, entire or shallowly angulate-lobed, slightly pubescent beneath or nearly glabrous at maturity; petioles 5–15 cm. long: panicles loose, without the slender peduncle 2–6 cm. long; sepals 6–10: drupe subglobose, about 8 mm. across, bluish black. Fl.v–vi; fr.x–xi. B.M. 1910(c). E.P.IV.94:256. F.E.28:261(h). G.W.1:63(h). Que. and Man. to Ga. and Ark. Cult. 1669. Zone IV.—Handsome climber, particularly attractive in autumn with its bluish black fr. resembling small grapes.

2. **M. daùricum** DC. Twining to 4 m.; brts. glabrous: lvs. orbicular-ovate, 6–12 cm. long, acute or acuminate, angulate-lobed, rarely entire, quite glabrous, glaucous beneath; petioles 3–12 cm. long: fls. in slender-stalked, short, often umbel-like panicles; sepals in the terminal fls. usually 6, in the lateral, 4: drupes about 1 cm. across, black in dense clusters. Fl.vi; fr.x(–v). G.F. 5:233. B.C.4:2034. E. Asia. Intr. 1883. Zone IV.—Similar to the preceding, but lvs. and fruiting clusters smaller; spreading by suckers.

30. MAGNOLIACEAE Jaume St. Hil. MAGNOLIA FAMILY

Trees or shrubs; lvs. deciduous or evergreen, entire or lobed; stipules present or wanting: fls. regular, usually perfect, hypogynous; sepals 3, often not differing from the petals, rarely 4; petals 6 or more, rarely wanting; stamens numerous, spirally arranged, rarely 4; carpels usually spirally arranged, rarely in a whorl; ovary 1-celled, with 1 to several ovules; seeds anatropous; carpels developing into follicles, samaras or berries.—Ten genera with about 80 species in the temp. and subtrop. regions of Am. and Asia.

A. Stamens numerous; parts of perianth 6–many: lvs. penninerved.
B. Stipules present, large, enclosing the succeeding young lf.: fls. perfect: upright trees or shrubs.
C. Lvs. entire, acute or acuminate: ripe carpel a dehiscent follicle.....1. *Magnolia*
CC. Lvs. lobed, truncate at apex: ripe carpel a samara.....2. *Liriodendron*
BB. Stipules wanting: fls. unisexual: ripe carpel berry-like: twining shrubs.
C. Carpels after anthesis spicate.....3. *Schizandra*
CC. Carpels after anthesis capitate.....4. *Kadsura*
AA. Stamens 4; sepals 4: lvs. palmately veined: tree.....5. *Tetracentron*

1. **MAGNÒLIA** L. Deciduous or evergreen trees or shrubs: buds large, with a single outer scale, bearing a petiole-scar above the base: lvs. petioled, entire, large; stipules adnate to the petiole and inclosing the young successive lf., their scar encircling the stem: fls. terminal, large, solitary, the bud enclosed in a stipular spathe; sepals 3, often petaloid; petals 6–15; stamens numerous; carpels numerous, adnate to a usually elongate torus developing

into a cone-like fruit consisting of dehiscent 1–2-seeded carpels; seeds suspended at maturity for some time by long thin threads. (After Pierre Magnol, director of the Botanic Garden at Montpellier; 1638–1715.) Syn.: *Kobus* Nieuwl. About 35 species in N. and C. Am. and in E. Asia and Himal.

A. Fls. after or with the lvs.: fr. subglobose to oblong, cone-like, usually symmetrical.
B. Lvs. deciduous or half-evergreen.
C. Fls. greenish or yellow: lvs. 18–35 cm. long, scattered.....1. *M. acuminata*
CC. Fls. white, large.
D. Lvs. cordate at base.
E. Leaf-buds and brts. tomentose: lvs. scattered, 50–75 cm. long.
2. *M. macrophylla*
EE. Leaf-buds and brts. glabrous: lvs. crowded at end of the brts.
F. Lvs. acute: tips of mature carpels nearly straight.....3. *M. Fraseri*
FF. Lvs. obtusely pointed: tips of mature carpels incurved.....4. *M. pyramidata*
DD. Lvs. cuneate at base, rarely rounded or subcordate.
E. Lvs. 12–60 cm. long, crowded at end of the brts.: buds and brts. glabrous.
F. Fr. 6–10 cm. long; carpels whitish during anthesis: lvs. gradually narrowed at base.....5. *M. tripetala*
FF. Fr. 12–16 cm. long: carpels purple: lvs. usually abruptly contracted at base.
6. *M. obovata*
EE. Lvs. 7–16 cm. long, scattered.
F. Lvs. obovate or broadly elliptic, often rounded at base, 4–11 cm. broad; sepals pink.
G. Young brts., petioles and peduncles pubescent: fls. 8–10 cm. across, slender-stalked.....7. *M. parviflora*
GG. Young brts., petioles and peduncles glabrous or nearly so: fls. 12–15 cm. across, on stout peduncles.....8. *M. Watsoni*
FF. Lvs. elliptic or ovate-oblong to oblong-lanceolate: fls. pure white.
G. Lvs. acute or acuminate, deciduous.
H. Lvs. densely silky-tomentose beneath.....9. *M. Wilsonii*
HH. Lvs. glabrous and glaucous beneath except the rufous-pubescent midrib.
10. *M. Nicholsoniana*
GG. Lvs. obtusish or obtusely short-acuminate, glaucous and nearly glabrous beneath, sometimes half-evergreen; pedicel 1–1.5 cm. long.
11. *M. virginiana*
BB. Lvs. evergreen, ferrugineous-pubescent beneath: fls. 15–20 cm. across.
12. *M. grandiflora*
AA. Fls. appearing before the lvs.: fr. cylindric, usually curved, unsymmetrical.
B. Sepals 3, much smaller and narrower than petals, greenish (except in No. 16); petals 6.
C. Fls. white.
D. Lvs. oblong-lanceolate or narrowly elliptic; broadest below the middle: leaf-buds glabrous.....13. *M. salicifolia*
DD. Lvs. obovate to obovate-oblong, broadest above the middle: leaf-buds slightly pubescent.....14. *M. kobus*
CC. Fls. purple, rarely nearly white.
D. Sepals small, lanceolate, greenish; petals purple.....15. *M. liliflora*
DD. Sepals usually half as long as petals and more or less petaloid; fls. sometimes nearly white.....16. *M. Soulangeana*
BB. Sepals and petals alike.
C. Sepals and petals 9, obovate, usually white: lvs. obovate, 8–15 cm. long.
17. *M. denudata*
CC. Sepals and petals 9–18, narrow-oblong: lvs. obovate-oblong, 5–8 cm. long.
18. *M. stellata*

Subgen. MAGNOLIASTRUM DC. Fls. after the lvs.; with one hood-like bud-scale: fr. globose-ovoid to oblong, symmetrical; carpels crowded, beaked.

1. **M. acuminàta** L. CUCUMBER-TREE. Pyramidal tree to 30 m.; brts. pubescent at first, later glabrous, red-brown, lustrous; buds pubescent; lvs. elliptic or ovate to oblong-ovate, or sometimes oblong-obovate, 10–24 cm. long, short-acuminate, rounded or acute at base, soft-pubescent and light green beneath: fls. campanulate, 6–8 cm. high; petals obovate-oblong, greenish or yellow; sepals lanceolate, much smaller, soon reflexed: fr. ovoid to oblong, 5–8 cm. long, red. Fl.v; fr. VIII–IX. B.M.2427(c). L.B.418(c). S.S.1:t.4,5. F.E.20:64,t.102(h). E.H.6,t.358(h). N. Y. to Ga., w. to Ill. and Ark. Intr. 1736. Zone V.—Var. **cordàta** Sarg. Lvs. broader, rounded or sometimes cordate at base: fls. smaller, canary-yellow. B.R.25(c). L.B.5: 474(c). S.S.1:t.6. Gn.34:509. (*M. c.* Mich x.) Ga.—Handsome pyramidal tree with rather short brs. upright at first, later spreading, and with inconspicuous fls., but attractive red fr. in late summer.

2. **M. macrophýlla** Michx. LARGE-LEAVED CUCUMBER-TREE. Tree to 18 m.; brts. tomentose at first; buds tomentose; lvs. oblong-obovate, 30–80 cm. long, obtuse, subcordate-auriculate at base, glaucescent and finely pubescent beneath: fls. cup-shaped, 25–30 cm. across, fragrant, creamy-white; petals 6, oblong-obovate, 12–20 cm. long, reflexed above the middle, purplish at base, thick; sepals somewhat shorter than petals: fr. globose-ovoid, pubescent, 6–8 cm. long, rose-colored. Fl.v–vi. B.M.2981(c). S.S.1:t.7,8. G.C.III.28:324. Gn.33:539. G.F.8:165(h). F.E.14:23(h). Ky. to Fla., w. to Ark. and La. Intr. 1800. Zone (V) VI.—Round-headed tree with stout spreading brs., remarkable for its large lvs. and large fls., though the latter are more or less hidden by the foliage.

3. **M. Fràseri** Walt. Tree to 15 m.; brts. and buds glabrous: lvs. spatulate-obovate, 20–50 cm. long, acute, cordate-auriculate at base, glaucescent beneath, glabrous; petioles slender, 4–7 cm. long: fls. 20–25 cm. across, creamy white, fragrant; petals 6–9, 8–12 cm. long, oblong-obovate, contracted below the middle; sepals 3, caducous, shorter than petals: fr. ovoid-oblong to oblong, 8–12 cm. long, rose-red. Fl.vi. B.M.1206(c). S.S.1:t.11,12. H.H.210, 211(b). Gn.44:935. F.E.33:1071(h). (*M. auriculata* Lam.) Va. to Ga. and Ala. Intr. 1787. Zone V.—Handsome tree with wide-spreading brs. forming an open head, with large bright green lvs., large white fls. and attractive rose-colored fr.

4. **M. pyramidàta** Pursh. Tree to 10 m., glabrous; closely related to the preceding species: lvs. obovate, 14–22 cm. long, obtusely short-acuminate, auriculate at base, glaucescent beneath; petioles slender, 2–4 cm. long: fls. 8–12 cm. across; petals gradually narrowed to the base; sepals much shorter: fr. oblong, 5–7 cm. long. Fl.vi. B.R.t.407(c). L.B.11:1092(c). S.T.1:t.51. Ga. to Fla. and Ala. Cult. 1825. Zone VI or VII?—Small pyramidal tree with ascending brs.; rarely cult.

5. **M. tripétala** L. UMBRELLA TREE. Tree to 12 m.; brts. and buds glabrous: lvs. oblong-obovate, 25–60 cm. long, acute or short-acuminate, usually cuneate at base, pale and pubescent beneath, at least while young; petioles 1.5–3 cm. long: fls. 18–25 cm. across, white, of heavy odor; petals 6–9, oblong-obovate, 8–12 cm. long; sepals shorter, finally reflexed, light green; filaments purple: fr. ovoid-oblong, 7–10 cm. long, rose-colored. Fls. v–vi. S.S.1:t.9,10. H.H.208, 209(b). Gn.33:539. C.L.5:494. (*M. umbrella* Lam.) Pa. to Ala., w. to Ark. and Miss. Intr. 1752. Zone V.—Tree with widespreading brs. forming an open head; remarkable for its large lvs. and large fls.; easily grown and often used as stock for other Magnolias to graft on.

M. t. × *virginiana* = **M. Thompsoniàna** Sarg. Buds glabrous: lvs. elliptic to oblong, 12–22 cm. long, acute, glaucescent and pubescent beneath: fls. 12–15 cm. across, fragrant; sepals shorter than petals. Fl.vi–vii. B.M.2164(c). G.F.1:269. Gn.24:511. (*M. glauca* var. *T.* Loud., *M. glauca* var. *major* Smith.) Orig. 1808. Zone VI.

6. **M. obovàta** Thunb. (not Willd. and later authors). Tree to 30 m.; brts. purplish, glabrous, like the buds: lvs. obovate, 20–40 cm. long, usually abruptly contracted at base, obtusely pointed, glaucescent and pubescent beneath at least while young; petioles 2.5–4 cm. long: fls. cup-shaped, 14–16 cm. across, white, fragrant; petals 6–9, obovate, leathery; sepals similar, but shorter; filaments and pistils bright crimson; anthers 1.6–1.8 cm. long: fr. cylindric-oblong, 14–20 cm. long, scarlet. Fl. v–vi. B.M.8077(c). M.D. 1904:1,t(c). S.I.1:t.39(c). G.F.1:305. (*M. hypoleuca* Sieb. & Zucc.) Japan. Intr. 1865. Zone V.—A handsome tree similar to *M. tripetala*, but of more pyramidal, less open habit and with showier fls.

A closely related species is **M. officinàlis** Rehd. & Wils. Brts. yellowish or grayish yellow; anthers 1–1.2 cm. long; fr. 10–12 cm. long. C. China. Intr. 1900. Zone VI?

7. **M. Watsòni** Hook. Small tree to 8 m. or more: brts. glabrous: lvs. obovate to oblong-obovate, 10–18 cm. long, obtusely pointed, glaucous and finely pubescent beneath, with 10–15 pairs of veins: fls. cup-shaped, 10–14 cm. across, white, fragrant, on stout pedicels usually 2–3 cm. long and glabrous or nearly so; petals usually 6, obovate; sepals oblong, finally deflexed, pink; stamens and carpels crimson; carpels many: fr. oblong, longer than in the following species. Fl. VI–VII. B.M.7157(c). Gn.24:508(c, as *M. parviflora*). Gt.48,t.1459(c). G.C.III.17:517. B.S.2:76. Habitat unknown. Cult. 1889. Zone VI?—Very handsome in bloom, with large fragrant fls., their beauty heightened by the crimson center and the pink sepals.

8. **M. parviflòra** Sieb. & Zucc. Small tree to 10 m.; young brts. and buds appressed-pubescent: lvs. broad-elliptic or obovate to obovate-oblong, 6–15 cm. long, obtusely pointed, glaucescent beneath and pubescent at first, with 6–10 pairs of veins; petioles 1–2 cm. long, silky-pubescent while young, like the midrib beneath: fls. cup-shaped, 7–10 cm. across, white, fragrant, on a slender pubescent stalk 3–6 cm. long; petals usually 6, obovate; sepals somewhat shorter, pink; carpels few, crimson like the filaments: fr. ovoid, 3–4 cm. long. Fl. VI–VII. B.M.7411(c). F.R.2:t.88(c). Gn.60:81(c). G.C.III.58: 276(fr). M.G.1913:484(h). (*M. Oyama* Kort.) Japan, Korea. Intr. about 1865. Zone (V) VI.—A handsome species with showy fls.

9. **M. Wilsònii** Rehd. Shrub or small tree to 8 m.; brts. and buds pubescent: lvs. ovate-oblong to oblong-lanceolate, 6–12 cm. long, acute or acuminate, rounded or sometimes subcordate at base, glabrous above, silky-tomentose beneath; petioles pubescent, 1.5–4 cm. long: fls. cup-shaped, 10–12 cm. across, white, fragrant, on pedicels 1.5–2 cm. long; sepals and petals 9, obovate, of equal size, thin; filaments and carpels crimson: fr. oblong-cylindric, about 6 cm. long. Fl. VI. B.M.9004(c). R.H.1923:338. (*M. parviflora* var. *W.* Finet & Gagnep.) W. China. Intr. 1908. Zone (V) VI.—A very distinct and handsome Magnolia.

10. **M. Nicholsoniàna** Rehd. & Wils. Shrub or small tree; buds pubescent; brts. pubescent at first, soon glabrous: lvs. elliptic-oblong to oblong or obovate-oblong, 8–12 cm. long, acute or acuminate, rounded at base, glaucous and glabrous beneath, except the densely rufous-pubescent midrib; petioles 2–4 cm. long, rufous-pubescent at first: fls. cup-shaped, about 10 cm. across, white, on slender pedicels about 3 cm. long; sepals and petals usually 12, the inner row shorter, obovate, thin; filaments and carpels crimson: fr. cylindric-oblong, 4–5 cm. long. Fl. VI. W. China. Intr. 1908. Zone (V) VI.

11. **M. virginiàna** L. SWEET BAY. Deciduous shrub, or half-evergreen tree to 20 m. in the South; brts. slender, glabrous; buds pubescent: lvs. elliptic to oblong-lanceolate, 7–12 cm. long, acute or obtuse, broad-cuneate at base, rarely rounded, glaucous beneath and silky pubescent at first; petioles slender, 1–2 cm. long, glabrous: fls. subglobose, 5–7 cm. across, white, fragrant; petals 9–12, obovate, sepals shorter and thinner, spreading: fr. ellipsoid, 4–5 cm. long, dark red. Fl. VI–VII. Em.603,t(c). L.B.215(c). S.S.1:t.3. G.F.10:403. (*M. glauca* L.—Sweet or Swamp Bay, Beaver-tree.) Mass. to Fla. and to Tex., near the coast. Intr. 1688. Zone V.—Var. **austràlis** Sarg. Young brts. and petioles densely silky-pubescent; pedicels tomentose. N. C. to Fla. and Tex. Tenderer than the type and cult. probably only south.—Very desirable and handsome shrub with lustrous lvs. persisting in the south until spring and with white fragrant fls.

12. **M. grandiflòra** L. Bull Bay. Evergreen pyramidal tree to 30 m.; brts. and buds rusty-pubescent: lvs. obovate-oblong or elliptic, 12–20 cm. long, obtusely short-acuminate or obtusish, cuneate at base, lustrous above, ferrugineous-pubescent beneath, firmly coriaceous; petioles stout, about 2 cm. long: fls. cup-shaped, 15–20 cm. across, white, fragrant, on a stout, tomentose pedicel; petals usually 6, rarely 9–12, obovate, thick; sepals 3, petaloid; filaments purple: fr. ovoid, 7–10 cm. long, rusty-tomentose. Fl. v–viii. S.S. 1:t.1,2. Gn.33:538. F.E.17:788, 781(h). J.L.46:315(h). (*M. foetida* Sarg.) N. C. to Fla. and Tex. Intr. before 1737. Zone (VII) VIII.—Var. **lanceolàta** Ait. Lvs. oblong-elliptic to oblong-lanceolate, less rusty beneath: of narrow pyramidal habit. B.M.1952(c). L.B.814(c). (Var. *exoniensis* Loud.) There are many other named varieties and forms of which var. **gallissoniénsis** Hort. is said to be the hardiest.—A magnificent evergreen tree, much planted in the warmer regions of this country and of Europe, with large lustrous lvs. and very large fragrant white fls.

A related evergreen species is **M. Delavayi** Franch. Tree to 10 m.; young brts. finely pubescent: lvs. ovate to ovate-oblong, 20–30 cm. long, dull green above, puberulous and glaucescent beneath; petioles 3–8 cm. long: fls. 15–20 cm. across, white, petals usually 7; sepals 3, reflexed: fr. about 12 cm. long. B.M.8282(c). S. W. China. Intr. 1900. Zone VIII?

Subgen. II. Gwillimia Rottler. Fls. before the lvs., with 2 bud-scales: carpels distant: fr. cylindric, unsymmetrical, usually curved and twisted; carpels with semiorbicular valves, not or rarely beaked.

13. **M. salicifòlia** Maxim. Slender tree to 10 m.; brts. and leaf-buds glabrous, slightly glaucous; fl.-buds densely pubescent: lvs. elliptic-ovate to oblong-lanceolate, 7–12 cm. long, acuminate, broad-cuneate at base, with about 12 pairs of veins, light green above, glaucescent and sparingly appressed-pubescent beneath; petiole slender, about 1–2 cm. long: fls. on short glabrous stalks, about 12 cm. across, white or purple at base outside, fragrant; petals 6, sometimes 7–13, narrowly oblong-obovate, 5–6 cm. long; sepals lanceolate, about half as long as petals, greenish white: fr. cylindric, 4–7 cm. long. Fl. iv–v. B.M.8483(c). S.I.1:t.40(c). G.F.6:67. G.C.III. 51:223. Japan. Intr. 1892. Zone V.—Handsome slender tree or shrub with precocious white fragrant fls.

A closely related species is **M. aulacospérmum** Rehd. & Wils. Lvs. light green beneath; petiole 5–15 mm. long; pedicel silky-pubescent: fr. 8–13 cm. long; seed deeply concave on the ventral side. R.H.1924:41(h). C. China. Intr. 1908. Zone VI?

14. **M. kòbus** Thunb. Tree to 10 m., usually shrubby in cult.; brts. glabrous; leaf-buds slightly, fl.-buds densely pubescent: lvs. broad-obovate to obovate, 6–10 cm. long, abruptly pointed, tapering to the cuneate base, light green beneath and pubescent on the veins, finally glabrous or nearly so; petioles 1–1.5 cm. long: fls. about 10 cm. across, white; petals 6–9, oblong-obovate, with a faint purple line at base outside; sepals narrow, about 1.5 cm. long, caducous: fr. cylindric, 10–12 cm. long. Fl. iv–v. B.M.8428(c). S.I.1:t.39(c). G.C.III.37:264. S.T.2:t.126. (*M. Thurberi* Hort., *M. kobushi* Mayr.) Japan: Hondo. Intr. 1865. Zone V.—Var. **boreàlis** Sarg. Pyramidal tree to 25 m.: lvs. larger, 6–15 cm. long: fls. about 12 cm. across, pure creamy white. Japan: Hokkaido, N. Hondo. G.F.6:66. B.C.4:1968. Intr. 1892. Zone V.—The typical form is usually shrubby in cult., with slender brs. and early appearing white flowers; the variety is a pyramidal tree, the hardiest of the Asiatic Magnolias, but not blooming freely while young.

M. k. × *stellata* = *M. Loebneri;* see under No. 18.

15. **M. liliflòra** Desrouss. Shrub to 3 m.; brts. glabrous, except near the

tips; buds pubescent: lvs. obovate or elliptic-ovate, acute or short-acuminate, tapering at base, 10–18 cm. long, dark green and sparingly pubescent above, light green beneath and finely pubescent on the nerves: fls. large, campanulate, purple outside and usually white inside, on very short and stout pedicels; petals 6, oblong-obovate, obtuse, 8–10 cm. long; sepals lanceolate, about ⅓ as long, greenish, caducous: fr. oblong. Fl. v–vi. B.M.390(c). Gn.46:49. (*M. purpurea* Curt., *M. obovata* Willd. and later authors, not Thunb., *M. discolor* Vent., *M. denudata* Schneid., not Desrouss.) China, much cult. in Japan. Intr. 1790. Zone (V) VI.—Var. **grácilis** Rehd. Small shrub with slender brs. and narrower leaves and smaller dark purple fls. Salisbury, Parad. Lond. t.87(c). (*M. gracilis* Salisb.) Intr. 1804 from Japan.—Var. **nígra** Rehd. Fls. larger, about 12 cm. long, dark purple outside and light purple inside. Gn.25:276,t(c). (*M. Soulangeana* var. *n.* Nichols.) Intr. 1861 from Japan. Zone (V).—A shrub with very showy purple fls. appearing in succession and partly with the lvs.; var. *nigra* seems to be hardier than the type and the other var.

16. × **M. Soulangeàna** Soul. (*M. denudata* × *liliflora.*) Large shrub or small tree: lvs. obovate, more or less pubescent beneath: fls. campanulate, more or less purplish, rarely white, scentless or fragrant; sepals usually petaloid, half as long or sometimes nearly as long as petals. Fl. v. B.R.14: t.1164(c). S.B.1:t.260(c). B.S.2:74,t(h). Gn.76:135(h);80:243(h). (*M. conspicua* var. *S.* Lindl.) Orig. 1820. Zone V.—Among the numerous forms one of the most distinct is var. **Lénnei** Rehd. Lvs. broad-obovate, pubescent on the nerves beneath: fls. rosy-purple outside, white inside; petals obovate, fleshy; sepals petaloid, narrower and paler and about half as long as the petals. F.S.16:t.1693–94(c). R.B.1:145,t(c). (*M. Lennei* Topf.)—Var. **rústica** is similar, but of lighter, more rose-red color. F.R.1:16,t(c). (*M. rustica rubra* Bean, *M. rustica fl. rubro* Hort.)—Forms with white or nearly white fls. are var. **spectàbilis** and var. **alba** (var. *alba superba*). G.3:449.—White fls. tinged purple outside toward the base have var. *Alexandrina* (B.R.26:t. 217(c). R.H.1912:317), var. *Brozzonii* (G.34:429, 431), *speciosa*, *Candolleana* and others.—The forms of this hybrid are very popular and much more planted than any of the parents; they belong to the most gorgeous of our flowering shrubs.

17. **M. denudàta** Desrouss. Tree with spreading brs., to 15 m.; young brts. and buds pubescent: lvs. obovate to obovate-oblong, 10–15 cm. long, short-acuminate, tapering at base, sparingly pubescent above, light green beneath and minutely pubescent chiefly on the nerves and slightly reticulate: fls. large, finally open campanulate, 12–15 cm. across, white, fragrant; petals and sepals alike, 9, oblong-obovate, concave, fleshy: fr. cylindric, 8–12 cm. long, brownish. Fl. iv–v. B.M.1621(c). L.B.12:t.1187(c). Gn.34:276,t(c); 47:402(h); 51:474(h). C.L.3:173. M.G.20:253. (*M. conspicua* Salisb., *M. Yulan* Desf., *M. precia* Correa.) C. China. Intr. 1789. Zone V.—Var. **purpuráscens** Rehd. & Wils. Fls. rose-red outside, pink inside; carpels and filaments rose-red. Ito, Fig. Pl. Koishikav. 1:t.8(c). C. China. Intr. 1901. Zone V?

M. d. × *Campbellii* = **M. Veìtchii** Bean. Lvs. obovate, 15–30 cm. long, downy on the veins beneath; petiole 2–2.5 cm. long, pubescent: fls. pink, with 9 petals, about 15 cm. long. Orig. 1907. Zone VIII?—*M. Campbellii* Hook. f. & Thoms. is not hardy within our area.

A closely related species is **M. Dawsoniàna** Rehd. & Wils. Lvs. smaller, scarcely acuminate, glaucescent and glabrous beneath, subcoriaceous: fls. unknown. C. China. Intr. 1908. Zone ?—Another related species is **M. Sargentiàna**

Rehd. & Wils. Tree to 25 m.: lvs. obovate, obtusish or acutish, sometimes emarginate, densely grayish pubescent beneath (but glabrous and glaucescent in the young seedling plants), subcoriaceous; petioles 1.5–4 cm. long: fr. to 18 cm. long in var. **robústa** Rehd. & Wils.; carpels beaked; fls. unknown, but said by the Chinese to be rosy-red and about 20 cm. across. W. China. Intr. 1908. Zone ?

18. **M. stellàta** Maxim. Shrub or small tree: young brts. and buds densely pubescent: lvs. obovate or narrow-elliptic to oblong-obovate, 4–10 cm. long, obtusely pointed or obtusish, gradually tapering at base, glabrous and dark green above, light green and reticulate beneath and glabrous or appressed-pubescent on the nerves; petioles 3–10 mm. long: fls. short-stalked, about 8 cm. across, white, fragrant; petals and sepals alike, 12–18, narrow-oblong, spreading and finally reflexed: fr. about 5 cm. long, twisted and with only a few fertile carpels. Fl. III–IV. B.M.6370(c). R.H.1878:270,t(c). B.S.1: 83,t(h). G.C.III.39:260(h),261. Gn.78:117;79:150(h). F.E.15:t.53(h). Japan. Intr. 1862. (*M. Halliana* Hort.)—Var. **ròsea** Veitch. Petals suffused outside with pink. R.B.30:85,t(h). J.H.27:865(h).—A much-branched wide-spreading shrub with a great profusion of early appearing white fragrant fls.; it flowers already as a small plant. It should have a sheltered position, as the delicate flowers are very susceptible to the effects of high wind, rain and frost.

M. s. × *kobus* = **M. Loèbneri** Kache. Lvs. larger, more obovate: fls. larger, with about 12 petals. Orig. before 1910.—Doubtful.

2. **LIRIODÉNDRON** L. Tulip-tree. Deciduous trees; buds covered by the 2 coherent stipules which are also conspicuous on the growing shoot and envelop each successive leaf: lvs. long-petioled, with a broad truncate apex and usually 1 or 2 broad lobes on each side: fls. terminal, solitary, campanulate; sepals 3, spreading; petals 6, upright; stamens numerous, with extrorse linear anthers and slender filaments; carpels numerous, densely imbricated on a spindle-shaped column developing into a cone-like brown fr.; each carpel consisting of a 1–2-seeded nutlet with a long narrow wing, finally separating from the spindle; seed albuminous with a minute embryo. (Greek *lirion*, lily, and *dendron*, tree.) Two species in N. Am. and China.

A. Filaments about 1 cm. long; petals 4–5 cm. long: mature carpels acute at the apex. 1. *L. Tulipifera*

AA. Filaments about 5 mm. long; petals 3–4 cm. long: mature carpels obtuse or obtusish at the apex. 2. *L. chinense*

1. **L. Tulipífera** L. Tree to 50 m., rarely to 60 m.; glabrous: brts. brown: lvs. saddle-shaped, 7–12 cm. long and about as broad, the broad truncate apex with a short-acuminate lobe on each side and usually 1 or 2, rarely 3 or 4, acute or short-acuminate lobes on each side near the rounded or truncate base, pale green beneath; petioles slender, 5–10 cm. long: fls. tulip-shaped, 4–5 cm. long; sepals ovate-lanceolate, greenish white, spreading, deciduous; petals oblong-obovate, greenish white with a broad orange band near base; stamens slightly shorter than the petals: fr. 6–8 cm. long; carpels 2.5–3.5 cm. long. Fl. V–VI; fr. X. B.M.275(c). S.S.1:t.13. Em.2:605,t. B.S.2:35. E.H.1:t.24–27(h). G.C.III.55:255(h). Mass. to Wisc., s. to Fla. and Miss. Cult. 1688. Zone V.—Var. **aureo-marginàtum** Rehd. Lvs. edged yellow. F.S.19:t.2025(c);20,t.2181(c).—Var. **obtusílobum** Pursh. With one rounded lobe on each side at base.—Var. **integrifòlium** Kirchn. Lvs. rounded at base, without lobes. S.H.1:f.218g(l).—Var. **pyramidàle** Lav. Tree with upright brs. forming a narrow-pyramidal head. (*L. T.* var. *fastigiatum* Jaeg.) —Beautiful tree of pyramidal habit with large lvs. of unusual shape turning clear yellow in autumn, and with large fls. conspicuous on account of their

size and shape though not brightly colored; in its native forest it is a magnificent tree with a tall columnar trunk destitute of brs. for a considerable height.

2. **L. chinénse** Sarg. Tree to 16 m., similar to the preceding; brts. gray: lvs. usually more deeply lobed, often halfway or more to the middle, with usually one pair of acuminate lobes near base, glaucescent and papillose beneath: fls. cup-shaped, green without, yellow within; petals 3–4 cm. long; filaments 5 mm. long: fr. 7–9 cm. long, with obtuse or obtusish carpels. S.T.1:t.52. H.I.28:2785. G.C.III.34:370;44:429(h). Jour. Hered. 9:274(h). C. China. Intr. 1901. Zone VII?

3. **SCHISÁNDRA** Michx. Deciduous or evergreen twining shrubs, more or less aromatic; buds with several imbricate scales: lvs. slender-petioled, entire or denticulate, estipulate: fls. in few-fld. axillary clusters, slender-stalked, unisexual; sepals and petals 7–12, not differentiated; stamens 5–15, more or less connate; carpels numerous, densely imbricate in flower, developing into berries disposed on an elongated receptacle and forming a drooping spike. (Greek *schizein*, to cleave, and *aner*, *andros*, man; referring to the cleft anthers of the type species.) About 12 species in E. and S. Asia and one in N. Am.

A. Pedicels 1.5–7 cm. long; stamens connate only at base: lvs. generally obovate, cuneate at base.
  B. Lvs. glaucous beneath ..... 1. *S. Henryi*
BB. Lvs. green beneath.
  C. Lvs. thickish: stamens with the free part of the filament as long as the anthers. 2. *S. grandiflora*
  CC. Lvs. thin, membranous: stamens with short filaments.
    D. Fr. black; seeds tuberculate: petioles often as long as the limb ..... 3. *S. nigra*
  DD. Fr. red; seed smooth: petioles about half as long as the limb.
    E. Stamens many ..... 4. *S. sphenanthera*
  EE. Stamens 5 ..... 5. *S. chinensis*
AA. Pedicels 5–10 mm. long; stamens connate into a globose head: lvs. ovate-lanceolate; petiole 5–15 mm. long ..... 6. *S. propinqua*

1. **S. Hénryi** Clarke. Glabrous; brts. angled or winged, brown: lvs. broad-elliptic or ovate, 6–10 cm. long, short-acuminate, broad-cuneate or rounded at base, remotely denticulate, lustrous above, glaucous beneath, leathery; petioles 2–4 cm. long: fls. 1.5 cm. across, white, on slender stalks 4–7 cm. long: fr. red, 5–7 cm. long. G.C.III.38:162. (*S. hypoglauca* Léveillé.) W. China. Intr. 1900. Zone ?

Another species which has the leaves glaucescent beneath is **S. glaucéscens** Diels, easily distinguished by its subterete brts., thinner obovate lvs. gradually narrowed toward the base, shorter petioles and the orange-red fls. C. China. Intr. 1907. Zone ?—Also **S. pubéscens** Hemsl. & Wils. has the lvs. glaucescent beneath but the young subterete brts., the petioles and the under side of the lvs. densely puberulous. C. China. Intr. 1907. Zone ?

2. **S. grandiflòra** Hook. & Thoms. Glabrous; stems subterete, brown: lvs. obovate or sometimes ovate to oblong-obovate, 6–10 cm. long, acuminate, cuneate at base, light green beneath, leathery: fls. 2.5–3 cm. across, pinkish; petals suborbicular; pedicels 2–3 cm. long: fr. scarlet, 12–20 cm. long. Fl. V–VI. Wallich, Tent. Fl. Nep. t.14(c). Ann. Bot. Gard. Calcutta, 3:t.69a. Temp. Himal. Not yet intr.—Var. **cathayénsis** Schneid. Lvs. usually smaller, more distinctly denticulate, sometimes glaucescent beneath and scarcely reticulate: fls. about 2 cm. across, fleshy-pink to blood-red. (*S. grandiflora* Fin. & Gagnep., not Hook. & Thoms.) W. China. Intr. 1907. Zone ?—Var. **rubriflòra** Schneid. Lvs. distinctly denticulate: fls. dark red, about 3 cm. across; pedicels 2–3 cm. long: fr. 8–12 cm. long. R.H.1925:450. M.O.t.4. G.C.III.78:271. (*S. r.* Rehd. & Wils.) Intr. 1908. Zone ?

3. **S. nígra** Maxim. Glabrous; brts. terete, brown or grayish brown: lvs. broad-ovate to elliptic or obovate, 5–7 cm. long, short-acuminate, cuneate or sometimes rounded at base, light green beneath, membranous; petioles 2–4 cm. long: fls. about 1.5 cm. across, white; pedicels 2–3 cm. long: fr. black, 2–5 cm. long; seeds tuberculate. Fl. v–vi. Japan, Korea. Intr. 1892. Zone V.

4. **S. sphenanthèra** Rehd. & Wils. Glabrous; brts. red-brown, terete: lvs. elliptic or obovate to obovate-oblong or ovate-lanceolate, 5–10 cm. long, acuminate, cuneate at base, denticulate, light green beneath and glabrous, rarely pubescent on the veins; petioles 1–3 cm. long: fls. orange, about 1.5 cm. across; pedicels 2–4 cm. long; stamens 10–15, anthers emarginate or truncate at apex: fr. 6–8 cm. long, red. Fl. v–vi. M.O.t.4. C. and W. China. Intr. 1907. Zone V?—Var. **lancifòlia** Rehd. & Wils. Brts. angled: lvs. lanceolate, long-acuminate. W. China. Intr. 1908.

5. **S. chinénsis** Baill. Climbing to 8 m.; brts. brown, slightly angled: lvs. broad-elliptic to broad-obovate to obovate, 5–10 cm. long, acute or short-acuminate, cuneate at base, denticulate, lustrous above, light green and sometimes glaucescent beneath and usually slightly pubescent on the veins while young; petioles 1.5–3 cm. long: fls. 1.5 cm. across, creamy white or pinkish, fragrant; petals ovate-oblong; stamens 5, emarginate at apex: fr. scarlet, 3–10 cm. long. Fl. v–vi; fr. viii–ix. Gt.11:t.382. F.S.15:t.1594(c). L.I:t.26(excl. f. 7–8). G.C.III.50:2. M.G.14:568(fr.). (*Maximowiczia sinensis* Rupr.) N. E. Asia, Japan. Intr. 1858. Zone V.—Twining shrub with dense bright green foliage, particularly attractive in autumn with its racemes of scarlet berries, but as the plant is dioecious care must be taken to plant both sexes.

6. **S. propínqua** Hook. f. & Thoms. Brts. angled: lvs. ovate or elliptic to oblong-lanceolate, 7–12 cm. long, short-acuminate, broad-cuneate or nearly rounded at base, remotely denticulate or serrulate, rarely entire, pale green or glaucescent beneath, leathery; petiole 1–1.5 cm. long, rarely 2 cm.: fls. orange, about 1.5 cm. across; petals oblong; pedicels 5–10 mm. long, bracteolate: fr. scarlet, about 15 cm. long. B.M.4614(c). (*Sphaerostema propinquum* Bl.) Himal., Malay Arch. Cult. 1828. Zone VIII?—Var. **sinénsis** Oliv. Lvs. oblong- or ovate-lanceolate to lanceolate, 6–10 cm. long, long-acuminate, rounded or broad-cuneate at base: fls. smaller, yellowish. Fl. vii–ix. C. and W. China. Intr. 1907. Zone VII?

The N. American **S. coccínea** Michx. occurring from S. C. to Tex. is apparently not hardy within our area.

4. **KADSÙRA** Juss. Evergreen twining shrubs; buds with several imbricate scales: lvs. slender-stalked, dentate to entire, estipulate: fls. unisexual, axillary, usually solitary, slender-stalked; sepals and petals 9–15, gradually changing from the small and green sepals to the larger white or pinkish petals; stamens numerous, distinct or coalescent into a globular head; carpels numerous, 2–3-ovuled, developing into berries forming a globose head. (The Japanese name of the plant.) About 10 species in trop. and subtrop. S. and E. Asia.

K. japónica L. Climbing to 3 m. or more, glabrous; lvs. elliptic to oblong-lanceolate, 5–10 cm. long, acuminate, cuneate at base, remotely dentate or denticulate, dark green above, lighter beneath; petioles 1–2 cm. long: fls. cup-shaped, about 2 cm. across, yellowish white, on slender stalks 1–5 cm. long: fr.-cluster scarlet, 2–3 cm. across. Fl. vi–ix. S.Z.1:t.17(c). Japan, Korea. Intr. 1846. Zone VIII.—Var. **variegàta** Hort. Lvs. irregularly bor-

dered with creamy white.—Handsome climber, particularly striking in autumn with its large scarlet fruiting heads.

5. **TETRACÉNTRON** Oliv. Deciduous tree; buds slender, pointed, upright-spreading with 2 outer sheathing scales: lvs. slender-petioled, palmately 5–7-nerved, crenulate-serrate, estipulate: fls. small, perfect, sessile, in slender pendulous racemes, apetalous; sepals 4, ovate, imbricate; stamens 4, opposite to the sepals, exserted; carpels 4, connate along the ventral suture; styles 4; ovules pendulous, several in each cell: fr. a 4-celled, deeply lobed dehiscent capsule; seeds linear-oblong. (Greek *tetra*, four, and *kentron*, spur; referring to the 4 spur-like appendages of the fr.) One species.

T. sinénse Oliv. Tree to 30 m., with smooth, rufous or gray bark: lvs. ovate to elliptic-ovate, 7–12 cm. long, acuminate, subcordate or rounded at base, closely serrulate with obtuse teeth: racemes 8–16 cm. long, short-stalked; fls. yellowish, minute; stamens 1.5 mm. long: fr. brown, about 4 mm. long. Fl.VI–VII. H.I.19:t.1892. C.C.133. C. and W. China. Intr. 1901. Zone (V) VI.—Handsome tree, similar to *Cercidiphyllum* but easily distinguished by the alternate lvs.

31. CALYCANTHACEAE Lindl. CALYCANTHUS FAMILY.

Deciduous or evergreen shrubs, with aromatic bark; buds scaly or naked: lvs. opposite, short-petioled, entire, penninerved, estipulate: fls. perfect, solitary, short-stalked, perigynous; parts of perianth numerous, spirally arranged, not differentiated into sepals and petals; stamens 5–30; anthers extrorse, innate; filaments short; carpels numerous, inserted inside of a hollow receptacle with the styles protruding, 1–2-ovuled, developing into one-seeded achenes inclosed by the urn-shaped receptacle, capsule-like at maturity, obovoid or ellipsoid; seeds without endosperm; cotyledons spirally rolled, broadly reniform, much broader than long, auriculate at base.—Two genera with 5 or 6 species in N. Am. and E. Asia.

A. Stamens 10–30; fls. brownish red; buds hidden or free.....1. *Calycanthus*
AA. Stamens 5 or 6; fls. yellowish white: buds free.....2. *Meratia*

1. **CALYCÁNTHUS** L. Deciduous shrubs; buds hidden by the base of the petioles or free; fls. terminal on short lateral brts.; stamens 10–30; brown or yellowish brown: fr. contracted at the mouth or campanulate. (Greek *kalyx*, calyx, and *anthos*, flower.) Three or 4 species in N. Am.

A. Buds hidden: anthers oblong: fr. contracted at the mouth.
B. Lvs. densely pubescent beneath.....1. *C. floridus*
BB. Lvs. glabrous or slightly pubescent beneath.....2. *C. fertilis*
AA. Buds free; anthers linear: fr. campanulate.....3. *C. occidentalis*

1. **C. flòridus** L. Carolina Allspice. Shrub to 3 m.: lvs. ovate or elliptic to narrow-elliptic, 5–12 cm. long, acute or acuminate, rarely obtuse, cuneate or rounded at base, grayish green and densely pubescent beneath; petiole about 5 mm. long: fls. dark reddish brown, about 5 cm. across, fragrant: fr. obovoid, 6–7 cm. long, usually much contracted at the mouth. Fl.VI–VII. B.M.503(c). Gn.21:184;33:392. S.L.130(h). Va. to Fla. Intr. 1726. Zone V.—Var. **ovàtus** Ait. Lvs. ovate to ovate-oblong, rounded or subcordate at base. L.I.t.24.—Shrub of rather straggling habit chiefly grown for its sweet-scented fls.; all parts of the plant and particularly the wood when dry exhale a pleasant camphor-like fragrance.

A closely related species is **C. Mòhrii** Small. Lvs. broad-elliptic or elliptic-ovate, broad-cuneate to subcordate at base: fls. purple, 5–6 cm. across: receptacle little contracted at the mouth. Tenn. to Ga. and Ala. Intr. 1906. Zone V.

2. **C. fértilis** Walt. Shrub to 3 m.; glabrous or slightly pubescent: lvs. elliptic or ovate to elliptic-oblong, 6–15 cm. long, acuminate or acute, cuneate or rounded at base, glaucous beneath: fls. greenish purple to reddish brown, 3.5–5 cm. across: fr. obovoid, 5–7 cm. long, contracted at the mouth. Fl. VI–VII. B.R.5:404(c). (*C. glaucus* Willd.) Pa. to Ga. and Ala. Intr. 1806. Zone V.—Var. **férax** Rehd. Lvs. usually elliptic-oblong, green beneath. B.R.6:481(c). (*C. laevigatus* Willd.)—Var. **nànus** Schelle. Low shrub: lvs. elliptic-ovate to ovate-oblong, 4–8 cm. long, green beneath. N.D.1:t.48(c). (*P. nanus* Lois.)—A shrub very similar to the preceding, but not quite as hardy.

3. **C. occidentàlis** Hook. & Arn. Shrub to 3 m.: lvs. ovate to oblong-lanceolate, 8–20 cm. long, acute or acuminate, rounded or subcordate at base, scabrous above, green and glabrous or slightly pubescent beneath; petioles about 5 mm. long: fls. brownish purple, changing to a tawny color at the tips of the sepals, 5–7 cm. across, fragrant; anthers linear: fr. ovoid-campanulate, not contracted at the mouth, 4–5 cm. long. Fl.VI–VIII. B.M. 4808(c). F.S.11:t.1113(c). Gn.33:392. (*C. macrophyllus* Hort.) Calif. Intr. 1831. Zone VI.—Of more vigorous and straggling growth than the preceding species and with larger lvs. and larger fls., but blooming less profusely and less hardy.

2. **MERÀTIA** Loisel. Deciduous or evergreen shrubs; buds with many imbricate scales: lvs. glabrous: fls. appearing long before the lvs., on very short scaly stalks from axillary buds on brs. of the previous year; sepals numerous, imbricate, yellow; stamens 5 or 6, short: fr. constricted at the mouth. (After François Victor Mérat, French physician and botanist; 1780–1851.) Syn.: *Chimonanthus* Lindl. Two species in China.

M. praècox Rehd. & Wils. Shrub to 3 m.: lvs. elliptic-ovate to ovate-lanceolate, 7–15 cm. long, acuminate, rounded or cuneate at base; petioles about 5 mm. long: fls. about 2.5 cm. broad, very fragrant, the outer sepals yellow, the inner striped purplish brown; fr. ellipsoid, about 4 cm. long. Fl.XII–III. B.M.466(c). L.D.3:t.173(c). G.C.III.11:213. Gn.87:36(fl,h). M.O.t.2(h). (*Calycanthus praecox* L., *Chimonanthus fragrans* Lindl.) China. Intr. 1766. Zone VII.—Var. **grandiflòra** Rehd. & Wils. Lvs. usually larger, occasionally to 20 cm. long; fls. about 3–3.5 cm. across, purer yellow, not as fragrant. R.H.1924:11,t(c). B.R.6:451(c). (*Chimonanthus fragrans* var. *g.* Lindl.)—Desirable shrub for warmer climates on account of its very fragrant fls. produced in mild seasons during the whole winter.

The evergreen **M. nìtens** Rehd. & Wils. (*Chimonanthus n.* Oliv.) with smaller coriaceous, long-acuminate lvs. and smaller and paler fls. (H.I.16:1600) is not in cult.

32. ANNONACEAE Rich. CUSTARD-APPLE FAMILY.

Deciduous or evergreen trees or shrubs: lvs. alternate, simple, entire, penninerved, estipulate: fls. perfect, rarely unisexual, hypogynous, rarely perigynous: perianth usually of 9 parts in 3 whorls; stamens usually numerous, spirally arranged; carpels usually numerous, distinct, rarely connate, 1- to many-ovuled, usually berry-like at maturity; seeds with copious ruminate endosperm and a small embryo.—More than 70 genera with more than 600 species, chiefly in the trop. regions of Asia, Afr., Am. Austral.—Only one species of the N. American genus Asimina is hardy within our area.

ASÌMINA Adans. Deciduous or evergreen shrubs, rarely trees; buds rather small, with 2–3 outer scales, brown-tomentose: lvs. usually large: fls.

axillary, solitary or few, nodding, on short stalks: sepals 3, caducous, smaller than the petals; petals 6, the inner ones smaller and usually upright; filaments short; carpels 3–15, many-ovuled, with recurved styles: fr. of one or few oval to oblong berries with large compressed seeds in 1 or 2 ranks. (Assiminier, a French-and-Indian name.) Eight species in N. Am.

A. tríloba Dun. Pawpaw. Small tree to 12 m.: brts. fulvous-pubescent while young, later glabrous and brown: lvs. obovate-oblong, 15–30 cm. long, short-acuminate, usually gradually narrowed into a petiole 5–10 mm. long: fls. 4–5 cm. across, lurid purple, on short fulvous-pubescent stalks about 1 cm. long; sepals ovate, acute, greenish pubescent outside; outer petals broad-ovate, rounded and later reflexed at apex; the inner upright, much smaller, pointed: carpels in fr. ellipsoid to oblong, 5–7 cm. long, greenish yellow at first, finally brown; seeds 2–2.5 cm. long. Fl.IV–V; fr.IX–X. B.M.5854(c). S.S.1:t.15,16. G.F.8:495. G.C.III.74:293, 295(h). R. H.1911:134,135. S.L. 105(h). (*Annona t.* L., *Uvaria t.* Torr. & Gr.) N. Y. to Fla., w. to Neb. and Tex. Intr. 1736. Zone V.—Handsome small tree with very large drooping lvs. and large curious fls. of lurid purple color; the large frs. are edible. It prefers a rich and rather humid soil. Interesting as the only hardy member of the large tropical family of Annonaceae.

33. LAURACEAE Lindl. LAUREL FAMILY.

Deciduous or mostly evergreen trees or shrubs, all parts containing an aromatic oil: lvs. usually alternate, simple, entire or lobed, usually with pellucid dots, estipulate: fls. perfect or unisexual, regular, usually small; perianth usually of 6 parts, in 2 similar whorls; stamens in 3–4 whorls of 3 each, often partly staminodial; anthers opening by valves; ovary usually superior, 1-celled, 1-ovuled; ovule pendulous, anatropous; style 1; stigma 2–3-lobed: fr. a drupe or a berry, with the pedicel often thickened below the fruit; seed without endosperm; embryo straight, with large fleshy cotyledons. —About 45 genera with 1000 species chiefly in trop. and subtrop. regions.

A. Lvs. persistent, penninerved: fls. perfect.
  B. Fls. in few-fld. cymes; calyx persistent under the fr. ..... 1. *Persea*
  BB. Fls. in umbels enveloped before anthesis in an involucre: calyx deciduous. 2. *Umbellularia*
AA. Lvs. deciduous, often 3-lobed, rarely lvs. persistent and fls. unisexual.
  B. Fls. in corymbs or umbel-like racemes; anthers 4-celled: lvs. 3-nerved at base. 3. *Sassafras*
  BB. Fls. in umbel-like sessile or stalked clusters; anthers 2-celled: lvs. penninerved or 3-nerved, rarely persistent. ..... 4. *Benzoin*

1. PÉRSEA Mill. Evergreen trees: buds naked: lvs. entire, penninerved, revolute in bud: fls. in small panicles or cymes; calyx 6-parted, persistent; stamens 12, the 3 of the inner whorl sterile and gland-like; the first 2 whorls with introrse, the third whorl with extrorse anthers; anthers 4-celled; ovary sessile, with slender style: fr. a berry with the persistent calyx-lobes at base. (An ancient name of an oriental tree.) Syn.: *Tamala* Raf. About 50 species in trop. and subtrop. Am. and 1 in the Canary Isls.

P. Borbònia Spreng. Red Bay. Tree to 12 m.; bark furrowed; brts. soon glabrous: lvs. oblong to lance-oblong, 5–10 cm. long, obtusely pointed, cuneate at base, glaucescent beneath, glabrous; petioles 5–10 mm. long: fls. in peduncled several-fld. cymes, the peduncle about as long as the petiole: fr. subglobose, about 1.2 cm. long, dark blue or nearly black. N.D.2:t.33(c). S.S.7:t.301. H.H.220, 221(b). (*P. caroliniensis* Nees, *Tamala B.* Raf., *Notaphoebe borbonica* Pax—Bull Bay.) S. Del. to Fla., in swamps. Intr.

1739. Zone VIII.—A handsome evergreen tree particularly attractive in autumn with its bluish black frs. on red stalks.

The closely related **P. palústris** Sarg. (*P. pubescens* Sarg.) is easily distinguished by the tomentose brts. and under side of the lvs.: it is probably less hardy.

2. **UMBELLULÀRIA** Nutt. Evergreen aromatic tree; buds naked: lvs. entire, penninerved, involute in bud: fls. perfect, on short pedicels in many-fld. stalked umbels enclosed before anthesis by an involucre of 5–6 imbricate scales; calyx 6-parted, deciduous; stamens of the third whorl with 2 conspicuous glands at base, those of the fourth whorl reduced to minute staminodes; style shorter than calyx-lobes. (From Latin *umbellula*, an umbelet; in reference to the inflorescence.) One species.

U. califórnica Nutt. Californian Laurel. Tree to 25 m., with scaly bark: lvs. short-petioled, ovate-oblong to lanceolate, 5–12 cm. long, obtusely acuminate, broad-cuneate at base, dark green and lustrous above, glaucous or glaucescent and reticulate beneath, glabrous at maturity: fls. yellowish green, in umbels about 1.5 cm. across; peduncle 1–2.5 cm. long: fr. ovoid, 2–2.5 cm. long, yellow green, sometimes purplish. Fl.I–v; fr.IX–X. B.M. 5320(c). S.S.7:t.306. J.S.t.10(h). (*Oreodaphne c.* Nees.) Calif. to Ore. Intr. 1829. Zone VIII.—Var. **péndula** Rehd. Tree with spreading brs. forming a broad head with pendulous brts. J.S.t.76(h).—Handsome evergreen tree with a dense head of lustrous foliage.

3. **SÁSSAFRAS** Nees. Deciduous trees; buds with few imbricate outer scales: lvs. entire or 1–3-lobed at apex, 3-nerved at base, involute in bud: fls. dioecious, unisexual or apparently perfect, in several-fld. racemes before the lvs.; calyx 6-parted; staminate fls. with 9 stamens in 3 whorls, those of the inner whorl with a pair of stalked glands at base, with or without staminodes and with or without pistil; anthers 4-celled, opening with 4 valves or 2-celled; pistillate with an ovoid ovary, slender style and 6 rudimentary stamens or with 9 stamens and 3 staminodes: fr. an ovoid drupe supported by a club-shaped fleshy pedicel. (Spanish salsafras = Saxifraga, referring to its supposed medical properties.) Three species in N. Am., China and Formosa.

S. officinàle Nees & Eberm. Sassafras. Tree to 20 or occasionally 38 m., with deeply furrowed bark; brts. pubescent while young, yellowish green: lvs. ovate to elliptic, 8–12 cm. long, entire or 1–3-lobed at apex, acutish or obtuse, cuneate at base, bright green above, glaucescent beneath and silky-pubescent while young; petioles 1.5–3 cm. long: fls. yellow, 7 mm. across, in racemes 3–5 cm. long; staminate fls. without staminodes and without rudimentary pistil: fr. ovoid, 1 cm. long, bluish black, bloomy, its fleshy stalk bright red. Fl.IV–V;fr.IX. Em.360,t.(c). S.S.7:t.304,305 G..C.III.76:89, t(h). B.S.2:501,t.(h). (*S. variifolium Ktze.*) Me. to Ont. and Mich., s. to Fla. and Tex. Intr. 1633. Zone IV.—Var. **álbidum** Blake. Buds and young brts. glabrous and glaucous: lvs. glabrous beneath. Mass. to S. C. and Ky.—Handsome pyramidal tree with bright green lvs. of distinct and peculiar shape turning orange and scarlet in autumn and with attractive dark blue red-stemmed fr.

A second species is **S. tzumu** Hemsl. Brts. and lvs. pubescent while young or glabrous; lvs. more pointed, sometimes to 20 cm. long; petioles to 6 cm. long: racemes with the peduncle 4–8 cm. long; fls. apparently perfect, with 9 fertile stamens and 3 staminodes. C.C.150. H.I.29:2833. Jour. Hered.9:275(h). (*Pseudosassafras t.* Lecomte.) C. China. Intr. 1900. Zone VII?

4. **BÉNZOIN** Fabric. Deciduous or evergreen aromatic trees and shrubs; buds with few to several imbricate scales: lvs. entire or 3-lobed, penninerved

or 3-nerved at base, convolute in bud: fls. dioecious or polygamous in axillary clusters, with an involucre of 4 deciduous scales; sepals 6, rarely more; staminate fls. with 9 stamens; anthers 2-valved; pistillate fls. with a globose ovary and 9–15 staminodes: fr. a subglobose drupe. (Of Arabic or Semitic origin, signifying gum or perfume.) Syn.: *Lindera* Thunb., including *Daphnidium* Nees and *Aperula* Bl. About 60 species in temp. and subtrop. E. and S. Asia; 2 in N. Am.

A. Lvs. penninerved, always entire.
B. Lvs. deciduous.
C. Fls. before the lvs. on very short pedicels: pedicel of fr. 1 cm. long or less.
D. Petiole 5–15 mm. long: fr. scarlet; buds with 2–3 outer pale scales. . 1. *B. aestivale*
DD. Petiole 1.5–2.5 cm. long, slender: fr. yellowish or brownish: buds with several lustrous brown scales . . . . . 2. *B. praecox*
CC. Fls. with the lvs.; pedicels about 5 mm. long: fr. subglobose, black . 4. *B. umbellatum*
BB. Lvs. persistent, 10–20 cm. long: fr. black, 1.5 cm. long . . . . . 3. *B. grandifolium*
AA. Lvs. 3-nerved at base, entire or 3-lobed; fr. subglobose, black . . . . . 5. *B. obtusiloba*

1. B. aestivàle Nees. Spice Bush. Shrub to 5 m.; glabrous or nearly so; buds with 2–3 outer scales: lvs. oblong-obovate, 7–12 cm. long, acute or short-acuminate, cuneate at base, light green above, pale beneath: fls. greenish yellow, in dense subsessile clusters 5 mm. across: fr. elliptic-oblong, about 1 cm. long, scarlet. Fl.III–IV; fr.IX. M.Am.2:t.145(c). Em.365,t. B.B.2:135. (*Lindera Benzoin* Bl., *B. Benzoin* Coult., *B. odoriferum* Nees.) Me. to Ont. and Kans., s. to Fla. and Tex. Intr. 1683. Zone IV.—Var. **xanthocárpum** G. S. Torrey. Fr. yellow. Mass.—Upright slender shrub with bright green lvs. changing to clear yellow in autumn, when the brs. are studded with scarlet frs.; also attractive in early spring with its yellow fls.

2. **B. praècox** Sieb. & Zucc. Shrub or small tree to 8 m.; glabrous; buds with lustrous brown scales; brts. brown with conspicuous white lenticels while young: lvs. ovate or elliptic, 4–9 cm. long, acuminate, cuneate at base, glaucescent beneath: fls. greenish yellow in subsessile or short-stalked umbels about 1.5 cm. across: fr. subglobose, 1.5–2 cm. across, yellow or reddish brown, on thickened pedicels about 1 cm. long; peduncle 3–5 mm. long. Fl.IV; fr.IX. (*Lindera p.* Bl.) S.I.2:t.19(c). Japan. Intr. 1891. Zone VI. —Shrub similar to the preceding; lvs. changing to yellow in autumn.

3. **B. grandifòlium** Rehd. Evergreen shrub or tree to 20 m.; brts. glabrous, dark purple-brown, with few pale lenticels; terminal buds with many imbricate velutinous scales: lvs. lance-oblong to oblanceolate, 10–20 cm. long, acuminate, cuneate at base, lustrous dark green above, glaucous and glabrous or slightly pubescent beneath; petioles 1–2 cm. long: fls. yellow, in many-fld. dense short-stalked silky umbels about 2.5 cm. across: fr. globose-ovoid, 1.5 cm. long, black, on stout pedicels about 1 cm. long. Fl.III–IV; fr.X. C.C.162. (*Lindera megaphylla* Hemsl.) C. and W. China. Intr. 1900. Zone VIII?—Handsome evergreen shrub with large lustrous lvs.

4. **B. umbellàtum** Ktze. Shrub to 3 m.; buds with 2–3 more or less silky outer scales; brts. dark purplish brown, rarely yellowish, without lenticels: lvs. elliptic-obovate or elliptic to obovate-oblong, 6–12 cm. long, acutish or short-acuminate, cuneate at base, glaucescent beneath and usually slightly pubescent at least on the midrib; petioles 1–1.8 cm. long: fls. yellow, with the lvs. in short-peduncled silky-pubescent umbels 2–2.5 cm. across; pedicels 6–10 mm. long: fr. subglobose, about 8 mm. long, black, on slender pedicels 1.5–2 cm. long. S.I.2:t.18(c). (*Lindera umbellata* Thunb., *L. membranacea* Maxim.) Japan, C. and W. China.—Var. **seríceum** Rehd. Lvs. beneath, brts. and pedicels more or less silky-pubescent. M.I.2:t.105. (*B. s.* Sieb. & Zucc., *Lindera sericea* Bl., *L. umbellata* var. *sericea* Mak.) Japan. Intr.

1892. Zone VI?—Var. **hypoglaûcum** Rehd. Lvs. glabrous beneath except the silky midrib and with a distinct glaucous bloom. (*L. hypoglauca* Maxim., *B. h.* Rehd.) Japan. Cult. 1880. Zone VI?

The closely related **B. glaucéscens** Sieb. & Zucc. from Japan and China which is not in cult. is easily distinguished by the pale yellowish gray brts. and by the lvs. being abruptly contracted into a short petiole only 2–4 mm. long.—Another related species not yet intr. is **B. Thunbérgii** Sieb. & Zucc. with pale yellowish or yellowish gray brts. and lance-oblong to oblanceolate lvs. gradually narrowed into a petiole 4–8 mm. long and with red frs. on pedicels about 1 cm. long. S.I.2: t.18(c). (*Lindera T.* Mak., *L. erythrocarpa* Mak.) Japan.

5. **B. obtusílobum** Ktze. Shrub or thin tree, to 10 m.; buds glabrous, with 3–4 outer scales; brts. yellowish gray, rarely purplish or yellow, glabrous, with scattered lenticels: lvs. broad-ovate, 6–12 cm. long, acute or obtusish, entire, cordate to broad-cuneate at the 3-nerved base, entire or 3-lobed at apex with the lateral lobes short and obtuse, grayish green and silky pubescent on the veins beneath; petioles 1–2 cm. long, silky-pubescent: fls. yellow, in subsessile silky-pubescent umbels 1–1.5 cm. across; pedicels 3–4 mm. long: fr. globose, 7–8 mm. across, black, on pubescent pedicels about 1 cm. long. Fl.IV; fr.IX. S.I.1:t.44(c). G.F.6:295. S.L.247(h). (*Lindera obtusiloba* Bl.) Japan, Korea, China. Intr. 1880. Zone VI.—Tall spreading shrub with handsome lobed lvs.

Two closely related species are the following: **B. trílobum** Sieb. & Zucc. Shrub to 6 m.: lvs. usually broad-cuneate at base or rounded, deeply 3-lobed with nearly equal acuminate lobes; fr. subglobose, 1.2 cm. across, greenish yellow, on glabrous pedicels. S.I.2:t.19(c). (*Lindera triloba* Bl.) Japan. Intr. 1915. Zone VI?—**B. cercidifôlium** Rehd. Shrub to 8 m.: lvs. suborbicular to ovate, 3.5–10 cm. long, short-acuminate, rounded at base, usually entire, rarely with 3 short acute lobes at apex, glabrous or nearly so beneath: fr. globose-ovoid, 6–7 mm. long, dark red. (*Lindera cercidifolia* Hemsley.) C. China. Intr. 1907. Zone VI?

34. CRUCÍFERAE Juss. MUSTARD FAMILY.

Herbs, rarely subshrubs or shrubs: lvs. usually alternate, entire to pinnatifid: fls. perfect, usually in terminal racemes, regular, rarely symmetrical; sepals 4; petals 4, rarely wanting; stamens 6, 4 longer and 2 shorter, rarely fewer or more; ovary superior, consisting of 2 carpels, 2-celled, rarely 1-celled, with 2 parietal placentae at the edges of the septum: fr. a dehiscent pod (silique or silicle), rarely indehiscent: seed with endosperm; embryo variously curved or folded.—More than 200 genera and 1600 species, chiefly in the temp. and colder regions of both hemispheres; few in the tropics. The family contains few shrubby plants; the genera enumerated below are only suffruticose with the exception of Vella which is a shrub.

A. Plants without hairs or pilose with simple hairs.
B. Plants suffruticose, usually glabrous, unarmed: pod compressed contrary to the septum.
C. Petals unequal; fls. white or pinkish ..... 1. *Iberis*
CC. Petals equal, rosy-purple ..... 2. *Aethionema*
BB. Plant shrubby, pilose, spiny or unarmed: fls. yellow: pod scarcely compressed, 1–2-seeded. 3. *Pseudocytisus*
AA. Plant stellate-pubescent: fls. yellow: pod flattened in the plane of the septum. 4. *Alyssum*

1. **IBÈRIS** L. CANDYTUFT. Herbs or subshrubs: lvs. glabrous or ciliate, entire to pinnatifid: fls. in usually umbel-like racemes; the outer 2 petals much longer than the inner ones; stamens without appendages: pod much compressed, roundish or broad-elliptic, usually winged, often notched at apex; seed 1 in each locule. (Ancient Greek name for a kind of cress.) About 30 species in S. Eu., W. Asia and N. Afr.—The following species are all evergreen perennials with woody usually procumbent stems (erect in *L. semperflorens*) and ascending brts. and with thickish fleshy lvs.

A. Flowering brs. branching above; outer fls. pink, inner white: lvs. obovate-oblong, dentate near apex.....1. *I. gibraltarica*
AA. Flowering brs. simple: fls. white, rarely pinkish: lvs. usually entire.
B. Lvs. linear to oblong or oblanceolate, rarely more than 5 mm. broad: pod winged; seeds wingless.
C. Racemes umbel-like in fl.: lvs. ciliate and stems finely pubescent.
D. Lvs. obtuse, oblong-linear, the lower obovate-oblong: fls. often pinkish.
2. *I. Tenoreana*
DD. Lvs. acute, usually linear: fls. white.....3. *I. saxatilis*
CC. Racemes elongated; stems and the narrow-oblong obtuse lvs. glabrous.
4. *I. semperflorens*
BB. Lvs. obovate-oblong, to 1 cm. broad, entire: pod wingless; seed winged.
5. *I. sempervirens*

1. **I. gibraltârica** L. To 40 cm. high: lvs. obovate to spatulate-oblong, 2–5 cm. long, obtuse, dentate near apex, sometimes entire, slightly ciliate toward the base: infl. to 4 cm. across, umbel-like; the outer fls. lilac-pink: usually lateral infl. in the axils of the upper lvs.: fr. deeply notched at apex. Fl.IV–VI. B.M.124(c). R.H.1870:330,t(c). B.C.3:1635. G.C.III.46:158(h). Spain, Morocco. Intr. 1732. Zone VII?

2. **I. Tenoreàna** DC. To 20 cm. tall: brts. finely hairy: lower lvs. obovate, upper narrow-oblong, 2–4 cm. long, obtuse, entire or dentate, ciliate: infl. umbel-like, 4–5 cm. across, the outer fls. often pinkish: fr. 6–8 mm. long, deeply notched. Fl.V. B.M.2783(c). L.B.18:1721(c). Italy. Intr. 1822. Zone VII? or VIII.—Var. **petraèa** Nichols. Fls. tinged red in the centre. B.C.3:1636(h). (*I. p.* Jord.)

A closely related species is **I. Pruítii** Tineo. It differs chiefly in the glabrous often subdentate lvs. and white fls. Sicily. By some authors *I. Tenoreana* is referred to this species as *I. Pruitii* var. *hirtula* Ten.

3. **I. saxâtilis** L. About 10 cm. tall; brts. and usually the infl. finely hairy: lvs. linear, 1–2 cm. long, acute, ciliate: infl. umbel-like, 2–2.5 cm. across; fls. white: fr. about 7 mm. long, notched at apex. Fl.V. R.I.2,t.8f. 4200(c). S. Eu. Intr. 1739. Zone V? or VI.

4. **I. sempérvirens** L. To 30 cm. tall; glabrous: lvs. linear-oblong, 1.5–3 cm. long, obtuse, entire: infl. 2–3 cm. across, elongating and finally racemose: fr. orbicular-elliptic, 6–7 mm. long, slightly or deeply emarginate. Fl.V. R.I.2:f.4198,4199(c). (*I. Garrexiana* All.) S. Eu., W. Asia. Intr. 1731. Zone V.—Var. **Garrexiàna** Nichols. Lvs. narrower, usually acute: fls. smaller. Gn.62:393(h). (*I. Garrexiana* Bak., not All.) It may be a hybrid of *I. saxatilis* and *I. sempervirens*.—Possibly another hybrid of *I. sempervirens* is **I. correaefòlia** Nichols. Lvs. spatulate, 2–4 cm. long, obtuse, entire: fls. white, in large infl. elongating and finally racemose.

5. **I. semperflòrens** L. Upright shrub to 60 cm., glabrous: lvs. obovate-oblong, with the petiole 3–6 cm. long, rounded at apex, gradually narrowed at base, entire: fls. white or sometimes pinkish, fragrant: infl. about 3 cm. across, becoming racemose: fr. broader than long, 8–10 mm. across, slightly emarginate, wingless; seeds winged. Fl.X–III. R.I.2:4201. S. Italy, Sicily. Intr. 1679. Zone VIII?

2. **AETHIONÈMA** R. Br. Herbs or subshrubs, sometimes spinescent: lvs. alternate, entire: fls. pinkish-purple or red, rarely whitish or pale yellow, in terminal racemes; sepals saccate at base; the longer stamens with usually dilated and often toothed filaments: pods compressed, winged, 2-celled, with 1 or several seeds in each cell, rarely 1-seeded and indehiscent. (Greek *aethein*, to scorch and *nema*, filament.) About 50 species chiefly mediterranean.

A. grandiflòrum Boiss. & Hohenack. Subshrub with slender simple brs. procumbent at base, to 40 cm. long, glabrous: lvs. linear-oblong to obovate-oblong, 2–4 cm. long, obtuse, bluish green: fls. in elongated racemes, to 7 cm.

long and 2.5 cm. across, rose-colored, petals 4 times as long as sepals; filaments dilated at base, not toothed: pods suborbicular with the wings much broader than the locules, deeply notched at apex; stigma subsessile; locules 1-seeded. Fl.v–viii. Gn.9:t.108(c). S.H.1:f.231a-h. Persia. Intr. 1879. Zone V or VI.—Handsome subshrub well adapted for rockeries; it prefers sunny positions.

A closely related species is **A. pulchéllum** Boiss. & Huet. Stems branched: fls. smaller; petals about 2½ times as long as the sepals, obovate; pods with erose-dentate wings. Gn.25:320,t(c). (*A. coridifolium* Hort., not DC.) Asia Minor. Cult. 1887. Zone V or VI.—Other species in cult. are the following: **A. diâstrophis** Bge. Fls. small: pods small with plicate deeply dentate curved wings; style slightly shorter than sinus. Asia Minor. Intr. 1841.—**A. coridifôlium** DC. It differs chiefly in its shorter crowded linear to linear-oblong lvs. often acutish, in the shorter and denser racemes with smaller fls., and in the obovate-oblong narrowly winged pods. B.M.5952(c). Gt.33:t.1150(c). (*Iberis jucunda* Schott & Kotschy.) Asia Minor. Intr. 1871.—**A. membranâceum** DC. Upright, to 15 cm.: lvs. linear-oblong, upright: racemes subcapitate; fls. 6 mm. long; longer filaments toothed at apex: pods with very broad entire wings, style short. S.B.t.69(c). Persia. Intr. 1828.—**A. grâcile** L. Ascending, to 20 cm.: fls. purplish, in dense racemes; longer filaments toothed at apex: pod obcordate with erose-dentate wings; style as long as sinus; locules 2–3-ovuled. Greece to Carniolia. Intr. 1820.—**A. iberídeum** Boiss. Cespitose, with scabrid brs., crowded narrow lvs. and white fls. in short and dense racemes: pods small, with curved wings; locules 2-ovuled. Greece, Asia Minor. Intr. about 1880.

3. **PSEUDOCÝTISUS** Ktze. Small shrubs, spiny or unarmed: lvs. alternate, entire, usually hirsute: fls. yellow, in racemes; longer filaments connate below: pod ovoid, slightly compressed, with convex valves; locules 1–2-seeded: seeds globose. (Greek *pseudos*, false, and *cytisus*.) Three species in Spain and Algeria.

P. spinòsus Rehd. Upright spiny shrub to 30 cm.: lvs. linear, 1–2 cm. long, fleshy, like the stem furnished with scattered bristly hairs sometimes nearly wanting: fls. few, about 1.5 cm. across; petals yellow, with brown veins; sepals erect, 6 mm. long: pod ovoid, 6 mm. long, beaked. Fl.vi. S.H.1:358. (*Vella spinosa* Boiss.) Cult. 1890. Zone VII or VIII.

P. integrifòlius Rehd. is probably still tenderer: unarmed shrub to 60 cm. or more: lvs. obovate, 1.5–2 cm. long, bristly: fls. larger, in elongated many-fld. racemes. B.R.293. (*Vella Pseudocytisus L., V. integrifolia* Salisb.) Spain. Intr. 1759

4. **ALÝSSUM** L. Herbs or subshrubs with stellate hairs: lvs. alternate, often forming rosettes, entire or toothed: fls. white or yellow, in terminal usually umbel-like racemes: longer stamens winged and toothed at apex: pods subglobose or ovoid, more or less compressed; valves convex, scarcely veined; each locule with 1 or 2 wingless seeds, rarely more. (Ancient Greek name.) About 100 species in Eu., the Mediterr. Region and Cauc.

A. saxâtile L. Golden-Tuft. Woody at base, to 30 cm., densely hoary-tomentulose: lvs. obovate-oblong to oblanceolate, obtuse or acutish, sometimes indistinctly toothed, the basal ones tufted, petioled, 6–10 cm. long with the petiole, the upper ones smaller, serrate: flowering stems much branched above, bearing numerous subumbellate heads about 1.5 cm. across of golden-yellow fls.; petals emarginate: pods suborbicular, compressed, 6–7 mm. long, glabrous. Fl.v. B.M.159(c). R.I.2:f.4280(c). B.C.1:269. C. and S. Eu. Intr. 1710. Zone V or IV.—A low tufted plant adapted for rockeries, covered with golden-yellow fls. in May.—Var. **variegâtum** Hort. has the lvs. margined white. Mottet & Nicholson, Dict. 1:127.

The closely related **A. gemonénse** L. differs chiefly in its broader and shorter lvs., in the incised petals and in the smaller slightly compressed pods about 4 mm. long. R.I.2:f.4281(c). S. Eu. Intr. 1710. Zone V.—Other related species are: **A. argénteum** Vitm. Subshrub to 40 cm., without tufted lvs. at base: lvs. obovate-

elliptic to oblanceolate, 6–20 mm. long, acutish, green and pilose above, white-tomentose beneath: fls. golden-yellow, in small heads forming large terminal corymbs: pod suborbicular, 3–4 mm. long, much flattened, stellate-pubescent. Fl.VI–VII. R.I.2:f.4277,4378(c). B.C.1:269. S. Eu., Asia Minor. Cult. 1830. Zone V.—**A. spinòsum** L. Dense spiny shrub to 30 cm.: lvs. oblong-lanceolate, 1–5 cm. long, like the brts. and infl. silvery-scurfy: fls. white to pink, in short racemes: pod glabrous. Gn.88:182(h). S. W. Eu., N. Afr. Intr. 1683. Zone VII?

35. CRASSULACEAE DC. ORPINE FAMILY.

Herbs or subshrubs, usually fleshy and mostly glabrous: lvs. usually alternate, entire or toothed: fls. mostly in terminal cymes, regular, usually perfect; sepals 5, rarely 3–30; petals as many; stamens as many or twice as many; carpels as many as petals, free, rarely connate, usually each with a scale at base; styles subulate; ovules usually many, rarely few or 1: fr. consisting of dehiscent leathery or membranous follicles.—About 500 species in 14 genera, chiefly in the warmer regions, much developed in S. Afr. and S. Eu.

1. **SÉDUM** L. Herbs or subshrubs: fls. yellow, white, pink or blue, in terminal cymes, usually 5-merous; stamens 10, the epipetalous adnate to the base of the petals; follicles free, many-seeded, rarely 1-seeded, dehiscent on the ventral suture. (Ancient Latin name.) About 140 species in the temp. and colder regions of the n. hemisphere; in Am. s. to Peru.

S. populifòlium L. Upright subshrub to 30 cm. tall, glabrous; older brs. purple-brown: lvs. slender-petioled, ovate, 1.5–3 cm. long, acute, subcordate at base, coarsely and irregularly dentate: fls. whitish or pinkish, in terminal corymbose cymes, 3–8 cm. across; petals lanceolate, 5–6 mm. long; anthers purple. Fl.VII–VIII. B.M.211(c). S.H.1:360. Gn.27:316;82:297(h). Siberia. Intr. 1780. Zone V.

36. SAXIFRAGACEAE Dum. SAXIFRAGE FAMILY.

Herbs, shrubs or small trees: lvs. alternate or opposite, usually without stipules: fls. perfect, regular, hypogynous or perigynous; sepals 4–5, rarely more; petals as many, valvate or imbricate; stamens as many or twice as many and the outer opposite to the petals; carpels 2–5, wholly or partly connate, rarely separate; styles or stigmas as many as carpels; ovules many: fr. a capsule or berry; seed small winged, with endosperm; embryo small with flat cotyledons.—About 75 genera with 700 species widely distributed in both hemispheres chiefly in temp. regions.

A. Lvs. opposite: fr. a capsule.
  B. Fls. all fertile with usually showy petals, in racemes or sometimes corymbose panicles.
    C. Fls. 4–5-, rarely 6-merous..
      D. Stamens numerous.
        E. Lvs. evergreen, penninerved: fls. 5–7-merous.....1. *Carpenteria*
        EE. Lvs. deciduous, usually dentate, 3–5-nerved at base: fls. 4-merous. 2. *Philadelphus*
      DD. Stamens twice as many as petals.
        E. Fls. 4-merous; ovary nearly superior: lvs. entire.....4. *Fendlera*
        EE. Fls. 5–6-merous: lvs. dentate.
          F. Ovary superior.
            G. Lvs. penninerved: fls. 5-merous.....3. *Jamesia*
            GG. Lvs. 3-nerved: fls. 5–6-merous, small.....6. *Whipplea*
          FF. Ovary inferior: lvs. with stellate hairs, rarely glabrous.....5. *Deutzia*
    CC. Fls. 7–10-merous; style 1: lvs. entire or nearly so.....10. *Decumaria*
  BB. Fls. of two kinds, small fertile ones and sterile enlarged marginal ones, rarely the latter wanting: infl. corymbose, rarely paniculate; ovary inferior or semi-superior.
    C. Sterile fls. with connate sepals, sometimes wanting: stamens many: buds stalked. 7. *Platycrater*
    CC. Sterile fls. with distinct sepals; stamens twice as many as sepals, rarely more: buds sessile.
      D. Styles 2–5, free: sterile fls. with 3–4 sepals.....8. *Hydrangea*
      DD. Styles 4–5, connate: sterile fls. with 1 large sepal.....9. *Schizophragma*

AA. Lvs. alternate: stamens 4–5.
B. Ovary superior: fls. in dense long racemes: fr. a caps. ..... 11. *Itea*
BB. Ovary inferior.
C. Fr. a caps.: lvs. usually coriaceous, serrate ..... 12. *Escallonia*
CC. Fr. a berry: lvs. usually palmately lobed: brs. often spiny ..... 13. *Ribes*

1. **CARPENTÈRIA** Torr. Evergreen shrub; brts. 4-angled: lvs. petioled, opposite, penninerved: fls. large in few-fld. terminal cymes; sepals 5–7, valvate; petals as many, convolute, clawless; stamens numerous: ovary superior, 5–7-celled; style short, with 5–7-lobed stigma: caps. leathery, conical, 5–7-valved; seeds numerous. (After William M. Carpenter; 1811–1848.) One species.

C. califórnica Torr. Shrub to 2.5 m.: lvs. elliptic-oblong to oblong-lanceolate, 4–10 cm. long, narrowed at ends, entire or indistinctly denticulate, bright green and glabrous above, glaucous and sparingly pubescent beneath; petioles 5–10 mm. long: fls. in 3–7-fld. cymes, white, 5–7 cm. across, fragrant, sepals ovate-lanceolate; petals orbicular-obovate. Fl.VI–VIII. B.M.6911(c). G.C.III.40:6,7;44:112. Calif. Intr. 1880. Zone VIII.—A very showy shrub when in bloom; demands sunny sheltered position and well-drained soil.

2. **PHILADÉLPHUS** L. MOCK-ORANGE. Deciduous shrubs; brs. with solid white pith and close or flaky bark; buds small usually hidden by the base of the petiole, sometimes free, with imbricate scales: lvs. opposite, entire or dentate, 3–5-nerved at base: fls. white, rarely purple near base, often fragrant, terminal on lateral brts., usually racemose, but often solitary or in 2–3-fld. cymes, rarely paniculate; sepals and petals 4; stamens numerous, styles 4, more or less connate; ovary 4-celled, inferior or half-superior: fr. a 4-valved capsule with numerous minute seeds. (Ancient name of unknown application.) About 40 species in N. Am., S. Eu. and Cauc., and in E. Asia to the Himal.—Deciduous shrubs of usually medium height, much planted in gardens on account of their showy often fragrant fls.; numerous hybrids have originated in cult. and make the distinction of the species very difficult.

A. Fls. in racemes or panicles.
B. Fls. in panicles, sometimes partly in racemes, but with the lower pedicels articulate.
C. Calyx outside and lvs. glabrous.
D. Lvs. subcordate at base ..... 1. *P. cordifolius*
DD. Lvs. broad-cuneate at base ..... 2. *P. californicus*
CC. Calyx outside and lvs. pubescent ..... 3. *P. insignis*
BB. Fls. in racemes.
C. Calyx glabrous outside.
D. Brts. of the previous season yellowish or grayish brown, rarely gray or brown, with not or scarcely exfoliating bark.
E. Bark yellowish or brown.
F. Lvs. acute or short-acuminate; racemes dense or only the lower pair remote.
G. Lvs. glabrous or nearly so, entire or slightly denticulate ..... 4. *P. Lewisii*
GG. Lvs. pubescent on both sides, at least those of the shoots dentate. 5. *P. Gordonianus*
FF. Lvs. long-acuminate: racemes loose; fls. 2–2.5 cm. across: bark brown, usually with longitudinal cracks ..... 15. *P. satsumanus*
EE. Brts. light gray, with always close bark: lvs. large, pubescent. 6. *P. pubescens* var.
DD. Brts. of the previous season with brown exfoliating bark.
E. Lvs. glabrous beneath or pubescent only near base.
F. Lvs. not bearded in the axils, sometimes sparingly pubescent beneath (if lvs. of flowering brts. about 2 cm. long see No. 31).
G. Pedicels glabrous: lvs. rather small, petiole usually purplish: fls. yellowish white ..... 18. *P. pekinensis*
GG. Pedicels pubescent: fls. pure white.
H. Style glabrous ..... 19. *tenuifolius*
HH. Style hairy at base ..... 20. *P. Schrenkii*
FF. Lvs. bearded or pubescent near the axils at base, otherwise glabrous.
G. Bark of brts. freely exfoliating: lvs. dentate.
H. Style shorter than stamens: lvs. ovate or elliptic: fls. creamy-white, very fragrant ..... 21. *P. coronarius*

HH. Style longer than stamens or nearly as long: fls. white, inodorous or slightly fragrant.
I. Lvs. ovate or elliptic, short-acuminate: fls. 4–4.5 cm. broad. 22. *P. Zeyheri*
II. Lvs. ovate-lanceolate to lanceolate, acuminate: fls. 3–3.5 cm. broad.
J. Style nearly as long as stamens; petals elliptic, obtuse. 17. *P. nepalensis*
JJ. Style longer than stamens; petals oblong, acutish. 24. *P. Falconeri*
GG. Bark slightly or scarcely exfoliating: lvs. denticulate or subentire. 4. *P. Lewisii*
EE. Lvs. more or less pubescent all over beneath.
F. Calyx green or greenish.
G. Lvs. with rather small remote teeth, ovate to oblong-ovate: bark slightly or not exfoliating.
H. Lower pedicels 0.5 cm. long: bark scarcely exfoliating: lvs. short-pubescent beneath. 15. *P. satsumanus* var.
HH. Lower pedicels 0.5-1cm. long: bark exfoliating: lvs. densely soft-pubescent beneath. 16. *P. tomentosus*
GG. Lvs. of shoots coarsely toothed, broad-ovate, loosely hairy beneath: bark freely exfoliating. 23. *P. floribundus*
FF. Calyx purple or purplish, glabrous; petioles and veins beneath often violet-purplish.
G. Young shoots glabrous: lvs. grayish tomentose beneath or nearly glabrous, 3–10 cm. long. 14. *P. Delavayi*
GG. Young shoots pubescent: lvs. strigose-pubescent beneath, 2–5 cm. long. 13. *P. purpurascens*
CC. Calyx pubescent outside.
D. Bark brown or yellowish brown, often exfoliating.
E. Lvs. oblong-obovate, serrulate with the teeth pointing forward.
F. Lvs. strigose-pubescent above; style hairy near base. 9. *P. Magdalenae*
FF. Lvs. glabrous or glabrescent above.
G. Lvs. pubescent beneath, at least on the veins.
H. Style glabrous at base; lvs. densely pubescent or subtomentose beneath. 10. *P. incanus*
HH. Style usually pilose at base: lvs. strigose beneath at least on the veins. 11. *P. subcanus*
GG. Lvs. glabrous or glabrescent beneath. 12. *P. sericanthus*
EE. Lvs. ovate or broad-ovate.
F. Lvs. dentate or denticulate with spreading teeth longer than 3 cm.
G. Style shorter than stamens.
H. Racemes 7–11-fld.: bark close, light yellowish or grayish brown. 8. *P. monstrosus*
HH. Racemes 5–7-fld.: bark brown or grayish brown.
I. Fls. single. 7. *P. verrucosus*
II. Fls. usually double. 34. *P. virginalis*
GG. Style as long as stamens: fls. large, usually in 5-fld. racemes, sometimes cymose. 28. *P. magnificus*
FF. Lvs. usually entire, shorter than 3 cm.: bark brown. 32. *P. polyanthus*
DD. Bark close, light gray. 6. *P. pubescens*
AA. Fls. solitary or 3, rarely 5, sometimes more and cymose.
B. Buds enclosed in the base of the petiole.
C. Lvs. large, usually over 3 cm., thin; style usually longer than stamens.
D. Pedicels and calyx glabrous.
E. Style with broad stigmas divided only at apex.
F. Lvs. usually entire, ovate, glabrous. 26. *P. inodorus*
FF. Lvs. dentate or denticulate, usually cuneate at base.
G. Fls. 1–3.
H. Lvs. usually oblong-ovate, dentate, usually glabrous. 27. *P. grandiflorus*
HH. Lvs. ovate-lanceolate to lanceolate, strigose beneath, denticulate. 25. *P. laxus*
GG. Fls. 5–9, rarely to 15: lvs. ovate, dentate. 22. *P. Zeyheri* var.
EE. Styles with narrow stigmas, divided nearly to base: fls. in 3–9-fld. cymes. 33. *P. cymosus*
DD. Pedicels and calyx pubescent.
E. Styles as long or longer than stamens, with broad stigmas: fls. 1–3. 28. *P. floridus*
EE. Style shorter, with narrow stigmas; fls. 3 or more in cymes, usually double. 34. *P. virginalis*
CC. Lvs. small, 5–20 mm. long: fls. usually solitary; styles slightly shorter than stamens, usually wholy united. 30. *P. microphyllus*
BB. Buds exserted: styles united.
C. Petals with purple blotch at base; stigmas free. 35. *P. purpureo-maculatus*
CC. Petals pure white; stigmas partly united. 36. *P. hirsutus*

Group 1. GORDONIANI Koehne. Fls. in racemes or panicles; calyx glabrous, rarely pubescent; stigmas narrower than anthers; bark* of brts. brown, yellowish or gray, close, or slightly exfoliating.

*The description of the bark always refers to brts. of the previous season.

1. **P. cordifòlius** Lange.. Shrub to 2 m.; bark red-brown, slightly exfoliating: lvs. broad-ovate, 5–10 cm. long, acute or short-acuminate, rounded to subcordate at base, denticulate or entire, glabrous except in the axils below: fls. 2.5–4 cm. across, in 15–40-fld. glabrous panicles, leafy below; sepals lance-ovate; petals elliptic-oblong; styles connate. Bot. Tidskr. III.2:t.3(c). D.L.3:344(as *P. Lewisii*). Calif. Intr. 1863. Zone VI.—A handsome shrub with large panicles of white fls.

2. **P. californicus** Benth. Shrub to 3 m.; bark pale brown to chestnut-brown, slightly exfoliating; buds slightly exserted: lvs. ovate to elliptic-ovate, rarely lance-ovate, 3–8 cm. long, acute, usually broad-cuneate at base, denticulate or entire, glabrous or sparingly hairy below; fls. fragrant, about 2.5 cm. across in 7–20-fld. panicles, occasionally in racemes, but the lower pedicels articulate; sepals ovate, short-acuminate; petals elliptic; styles connate. Fl.VI–VII. S.H.1:f.234a-a^2,263a. (*P. Lewisii* var. *parvifolius* Torr.) Calif. Cult. 1858. Zone VI.

3. × **P. insignis** Carr. (*P. pubescens* × *cordifolius* or *californicus*?) Tall shrub: bark light grayish brown, close or slightly exfoliating: lvs. ovate or broad-ovate, 3.5–7 cm. long, short-acuminate, broad-cuneate to slightly subcordate at base, entire or denticulate, glabrous above, grayish pubescent beneath: fls. about 3 cm. across, in 15–30-fld. leafy panicles; pedicels and calyx pubescent; petals obovate; styles connate. Fl.VI–VII. S.H.1:f.236g(l). (*P. Billiardii* Koehne, *P.* "Souvenir de Billiard" Carr.) Origin. before 1870. Zone V.—An upright shrub with large panicles of slightly fragrant fls.; one of the latest to bloom.

[*P. i.* ? × *Lemoinei* = *P. polyanthus;* see No. 32.

4. **P. Lewisii** Pursh. Shrub to 2 m.; young brts. glabrous; bark red-brown or yellowish brown, with cross-cracks and tardily exfoliating: lvs. ovate to ovate-oblong, 3–7 cm. long, acute, usually cuneate at base, entire or denticulate, 3–5-ribbed, the strongest pair arising some distance from the base, usually villous in the axils of the veins below, otherwise glabrous, those of the shoots larger, denticulate and often rounded at base: fls. 2.5–3.5 cm. across, scentless, in 5–9-fld. dense racemes, only the lowest pair in the axils of lvs.; pedicels glabrous, the lower about 5 mm. long; sepals lance-ovate; petals elliptic to elliptic-oblong; styles divided only at apex or nearly to the middle. Fl.VI–VIII. S.H.1:f.236h,237a-b. Mont. to Wash. and Ore. Intr. 1823 or 1884? Zone V.

A closely related species is **P. confùsus** Piper chiefly distinguished by the yellowish or gray close bark of the brts. and by the ovate acute sepals. Wash. Intr. ?

5. **P. Gordonianus** Lindl. Shrub to 4 m.; young brts. slightly pubescent; bark yellowish or gray, not exfoliating: lvs. ovate or elliptic-ovate to elliptic-oblong, 4–8 cm. long, acuminate, cuneate at base, usually dentate, rarely nearly entire, coarsely dentate and rounded at base on shoots, usually strongly 5-ribbed, all ribs arising from the base, pubescent beneath: fls. 3–4.5 cm. across, slightly fragrant, in 7–9-, rarely 11-fld. dense racemes; pedicels pubescent; sepals ovate or lance-ovate, sometimes with a few hairs outside; petals elliptic to oblong; styles usually united ½ or ⅔. Fl.VI–VII. B.R.25:32(c). D.L.3:342. N.I.3:f.107. M.O.224. (*P. Lewisii* Auth., not Pursh.) B. C. to Idaho and N. Calif. Intr. about 1825. Zone V.—Var. **columbianus** Rehd. Lvs. usually elliptic-ovate, 3–5 cm. long, 3–5-ribbed, the stronger ribs some distance from the base, those of the shoots ovate, with usually 2–4 coarse teeth on each side, the hairs of the upper surface often with pustulate bases. S.H.1:f.236k(l). (*P. c.* Koehne, *P. Gordonianus* var. *californicus* Dipp., in

part?) B. C. and Idaho and N. Calif. Cult. 1890. Zone V.—A rather tall shrub with spreading lateral brs. and profuse large fls., the var. smaller in every part.

P. G. ? × *pubescens* = *P. monstrosus*; see No. 8.—*P. G.* × *coronarius* = *P. floribundus;* see No. 23.—*P. G.* ? × *grandiflorus* = *P. splendens;* see under No. 27.

6. **P. pubéscens** Lois. Shrub to 3 m.; bark light gray, close: lvs. ovate to elliptic, 4–10 cm. long, acuminate, rounded or broad-cuneate at base, sometimes subcordate on shoots, remotely dentate, rarely nearly entire, dark green and nearly glabrous above, densely grayish pubescent beneath: fls. 3–4 cm. across, scentless, in 5–9-fld. racemes, usually the 2 lower pairs in the axils of rather remote lvs.; pedicels and calyx pubescent; sepals ovate, acuminate; petals obovate or oval; style united about ⅔. Fl.VI–VII. L.D. 4:t.268(c). W.D.1:46(c). B.R.7:570(c) and Gn.40:289 as *P. grandiflorus.* (*P. latifolius* Schrad., *P. grandiflorus* var. *floribundus* Gray.) Tenn. to Ala. and Ark. Intr. 1800. Zone V.—Var. **intéctus** A. H. Moore. Lvs. nearly glabrous beneath and calyx glabrous outside. (*P. i.* Beadle.) Intr. about 1880. Zone V.—Vigorous shrub with large dark green lvs.; the fls. partly hidden by the foliage.

P. p. × *coronarius* = **P. nivâlis** Jacques. Bark brown, usually exfoliating: lvs. ovate, usually rounded at base, less coarsely serrate and usually only sparingly pubescent beneath: fls. 3–4 cm. across, in 5–9-fld. racemes; pedicels 3–8 mm. long, rarely longer, like the calyx clothed with long villous hairs, rarely glabrescent; petals oval or obovate; style divided only at apex; stigmas longer than anthers, as broad. (*P. verrucosus* var. *n.* Rehd., *P. verrucosus* Hort., not Schrad.) Orig. before 1840.—Var. **plènus** Rehd. Fls. double. (*P. verrucosus* var. *n.* f. *pl.* Rehd., *P. n. spectabilis pl.* Hort.)—*P. n. pl.* × *Lemoinei* = *P. virginalis;* see No. 34.—*P. p.* × ? *laxus* = **P. pendulifòlius** Carr. Low shrub; bark chestnut-brown, tardily exfoliating: lvs. ovate or elliptic, pendent, pubescent beneath: fls. 2.5–3 cm. across, short-stalked, in 5–7-fld. racemes; styles as long as stamens, divided only at apex. Orig. before 1875.—*P. p.* × *californicus* = *P. insignis;* see No. 3.—*P. p.* × *Gordonianus* = *P. monstrosus;* see No. 8.—*P. p.* × *tomentosus* = *P. maximus;* see under No. 16.—*P. p.* × *grandiflorus* = *P. magnificus;* see No. 28.

7. **P. verrucòsus** Schrad. Shrub to 3 m.; bark brown or grayish brown, close or tardily exfoliating: lvs. ovate or elliptic-ovate, 4–7, on shoots 5–11 cm. long, acuminate, rounded or broad-cuneate at base, denticulate or dentate, glabrous above, pubescent beneath: fls. 2.5–3 cm. across, scentless or slightly fragrant, in 5–7-fld. racemes, the lowest or 2 lower pairs usually in the axils of lvs.; pedicels 3–5 mm. long, strigose-pubescent like the calyx; style usually divided ¼ or ⅓; stigmas narrower than anthers. Fl.VI. S.H. 1:f.235f-m,236l-m,237i-l. (*P. pubescens* Koehne, not Loisel.) Ill. Cult. 1828. Zone V.—The hybrid *P. nivalis* is very similar to this species.

P. v. ? × *laxus* = **P. congéstus** Rehd. It differs chiefly in its smaller and narrower lvs. and in the short and congested usually 5-fld. racemes: fls. 3–4 cm. broad; style shorter than stamens; stigma as broad or nearly as broad and longer than anthers; calyx slightly pubescent outside chiefly toward the base. Origin unknown.

8. × **P. monstròsus** Rehd. (*P.*? *Gordonianus* × *pubescens.*) Tall shrub; young brts. nearly glabrous, light or sometimes yellowish brown; mature brts. light grayish brown, with cross-cracks, but not exfoliating: lvs. usually ovate, sometimes ovate-oblong, 3–8 cm. long, short-acuminate, usually rounded or sometimes broad-cuneate at base, remotely denticulate, on shoots always ovate, with 4–8 pairs of rather shallow teeth, nearly glabrous above, densely grayish pubescent beneath: fls. 3–4 cm. across, scentless, in 5–13-, usually 7–9-fld. racemes, the lower pair usually remote; lower pedicels 3–5 mm. long, pubescent; calyx loosely pubescent outside; petals elliptic-oblong, rarely elliptic; style shorter than stamens, stigmas shorter and narrower

than anthers. W.A.104,t(h). (*P. Gordonianus m.* Hort.) Orig. unknown; cult. 1897.

Group 2. Sericanthi Rehd. Bark of brts. brown with cross-cracks and usually more or less exfoliating: lvs. serrate-denticulate with the teeth pointing forward, never entire, more or less pubescent beneath, rarely glabrous: fls. subcampanulate, in 5–11-fld. secund racemes; calyx usually pubescent, or glabrous and violet-purple; style shorter than stamens; stigmas narrower than anthers.

9. **P. Magdalènae** Koehne. Shrub to 4 m.; young shoots pubescent at first, flowering brts. glabrous, older brts. brown or grayish brown, usually exfoliating: lvs. ovate to lance-ovate, 3–5, on shoots to 8 cm. long, long-acuminate, broad-cuneate or rounded at base, denticulate or dentate, pubescent above, densely strigose-pubescent beneath, chartaceous: fls. about 2.5 cm. across, scentless, in 7–11-fld. racemes; lower pedicels about 5 mm. long; calyx strigose-pubescent; sepals ovate; petals broad-elliptic; style connate to above the middle, pubescent at base. Fl.vi. V.F.129. S.L.290(h). W. China. Intr. 1894. Zone (V).—Handsome free-flowering shrub with spreading brs.; the secund racemes give this and the following species somewhat the aspect of a large-fld. Deutzia.

10. **P. incànus** Koehne. Shrub to 3, or occasionally 5 m.; young flowering brts. slightly, shoots densely pubescent; bark of older brts. brown, soon exfoliating in small flakes; lvs. ovate to oblong-ovate, 3–6, on shoots to 8 cm. long, acuminate, broad-cuneate or rounded at base, serrate, slightly pubescent or glabrescent above, densely grayish strigose-pubescent beneath: fls. 2.5–3 cm. across, scentless, in 5–7-fld. pubescent racemes; pedicels short; calyx densely grayish pubescent outside; petals broad-elliptic; style glabrous, rarely with a few hairs at base. Fl.vii. B.S.2:135. W. China. Intr. about 1895. Zone (V).—Shrub with upright brs.; valuable as one of the last species to bloom.

11. **P. subcànus** Koehne. Shrub to 3 m.; young flowering brts. slightly pubescent, shoots pubescent; older brts. with light or dark brown exfoliating bark: lvs. usually oblong-ovate or ovate, 4–8, on shoots to 12 cm. long, acuminate, rounded or broad-cuneate at base, denticulate or serrulate, glabrous or nearly so above, strongly veined and strigose pubescent chiefly on the veins and veinlets beneath: fls. 2.5–3 cm. across, in 5–9-fld. racemes; lower pedicels 5–10 mm. long, like the calyx densely pubescent; style usually pubescent at base. Fl.vi. C. and W. China. Intr. 1907 or before. Zone V.—Var. **Wilsónii** Rehd. Larger in all parts, to 6 m. tall; lvs. of flowering shoots 10–14 cm. long; racemes 9–15-fld. (*P. W.* Koehne.) Probably not in cult.—Closely related and similar to *P. incanus*, but less pubescent and blooming several weeks earlier.

12. **P. sericánthus** Koehne. Shrub to 4 m.; young brts. glabrous, soon becoming red-brown; bark chestnut-brown, exfoliating: lvs. elliptic-ovate to lance-ovate, 3–6, on shoots to 10 cm. long, long-acuminate, broad-cuneate, rarely rounded at base, remotely serrulate, or serrate on shoots, with 3–10 pairs of teeth, dark green and sparingly strigose or glabrous above, lighter green below and glabrous or with few scattered hairs on the veins and bearded in the axils; veins beneath and petiole often red or violet: fls. 2.5–3 cm. across, scentless, in 5–9-fld. racemes; calyx and pedicels densely strigose-pubescent; lower pedicels 5–10 mm. long; petals broad-elliptic; style divided about ½, glabrous. Fl.vi. B.M.8941(c). S.H.1:f.236f,237m-o. C. and W. China. Intr. 1896. Zone V.—Var. **Rehderiànus** Koehne. Lvs. larger, on the flowering brts. to 11 cm. long, sparingly pubescent on the veins beneath.

W. China. Intr. 1908. Zone (V).—Handsome shrub with spreading brs. and numerous secund racemes. Possibly *P. parviflorus* Carr. is this species.

13. **P. purpurascens** Rehd. Shrub to 4 m.; young flowering brts. glabrous, shoots sparingly strigose-pubescent; bark brown, exfoliating: lvs. elliptic-ovate or ovate to lance-ovate, 2–3, on shoots to 5 cm. long, acuminate, broad-cuneate or rounded at base, remotely serrulate or serrate, more or less appressed-pilose above, sparingly or sometimes densely strigose-pubescent beneath, rarely nearly glabrous: fls. about 2.5 cm. across, pure white, very fragrant, in 5–9-fld. racemes; lower pedicels 4–7 mm. long; calyx glabrous, violet-purple, rarely greenish; petals broad-elliptic; style connate to the stigmas. Fl. VI. B.M.8324(c, as *P. Delavayi*). (*P. brachybotrys* var. *p.* Koehne.) W. China. Intr. 1904. Zone V.—Handsome shrub with spreading and arching brs., and with small lvs. and an abundance of sweet-scented fls. whose white color is effectively set off by the purple calyx.

A closely related species is **P. venustus** Koehne. Bark grayish, not exfoliating: lvs. oblong-lanceolate, 3–4 cm. long, densely grayish pubescent beneath: racemes 3–5-fld. Tibet. Intr. about 1900. Zone V? Possibly the preceding species is referable as a variety to this.

14. **P. Delavayi** L. Henry. Shrub to 5 m.: young brts. quite glabrous, purplish, bloomy; bark chestnut- or grayish brown, exfoliating, sometimes slightly so; lvs. ovate-oblong or lance-ovate, 3–6, or on shoots to 10 cm. long, acuminate, usually rounded at base, remotely serrulate or serrate, short-pubescent and dark green above, grayish tomentose beneath: fls. 3–4 cm. across, very fragrant, in 5–11-, sometimes 13-fld. racemes; lower pedicels 5–10 mm. long; calyx glabrous, violet-purple, often bloomy; petals oval, sometimes tinged slightly purplish outside; styles glabrous, connate ¾ or nearly to the stigmas. Fl. VI. R.H.1903:13. Yunnan. Intr. 1888. Zone (V). —Var. **melanocalyx** Lemoine is a form with dark purple calyx.—Var. **calvescens** Rehd. Lvs. pubescent beneath only on the veins, or nearly glabrous, sparingly strigose above. B.M.9022(c). (*P. Delavayi* Stapf, not L. Henry.) Intr. about 1915?—Vigorous upright shrub with large very fragrant fls.

Group 3. Coronarii Koehne. Bark brown or grayish brown exfoliating (except in No. 15): lvs. dentate or denticulate, not entire: fls. early, in upright racemes; calyx glabrous, not purplish; stigmas narrow.

15. **P. satsumanus** Miq. Shrub to 2.5 cm.; bark brown or grayish brown, usually with longitudinal cracks, not or slightly exfoliating: lvs. ovate to ovate-lanceolate, 4–8 cm. long, rarely more, long-acuminate, broad-cuneate or rounded at base, remotely denticulate-serrulate, glabrous except bearded in the axils beneath and sometimes sparingly hairy on the midrib; petiole 5–10 mm. long: fls. about 2.5 cm. across, slightly fragrant, in 5–9-, usually 7-fld. rather loose racemes; lower pedicels about 5 mm. long, glabrous or pubescent; calyx glabrous or finely pubescent along the ribs ending in the sinuses; petals oval; style divided ¼ or ½. Fl. VI. Bot. Tidsskr. III.2:t.2(c). S.H.1:f.237f-h,238a. (*P. satsumi* Koehne, not Lindl. & Paxt., *P. acuminatus* Lange.) Japan. Intr. before 1860. Zone V.—Var. **nikoensis** Rehd. Young brts. and lvs. beneath more or less pubescent, sparingly so above. Intr. 1892.—A slender upright shrub with rather small slightly fragrant fls.

16. **P. tomentosus** Wall. Shrub to 3 m.; young brts. sparingly hairy or nearly glabrous; bark brown, slightly or rather freely exfoliating: lvs. elliptic-ovate or ovate, 4–8 cm. long, long-acuminate, broad-cuneate or rounded at base, remotely denticulate or dentate, dark green and slightly pubescent or glabrous above, densely grayish soft-pubescent beneath: fls. fragrant, about 3 cm. across, in 5–7-fld. racemes; lower pedicels sparingly pubescent, 7–10

mm. long; calyx glabrous or with a few hairs; petals oval; style divided only at the apex. Fl.vi. Royle, Ill. Bot. Himal. 1:t.46(c). D.L.3:338. S.H.1: f.237c-e,238b. (*P. coronarius* var. *t.* Hook f. & Thoms., *P. nepalensis* Lodd.) Similar to *P. coronarius*, but lvs. tomentose beneath. Himal. Intr. 1822. Zone V.

P. t. × *pubescens* = **P. máximus** Rehd. Tall shrub; bark brown or grayish brown, close or slightly exfoliating: lvs. tomentose beneath: fls. with pubescent calyx. Orig. before 1885.

17. **P. nepalénsis** Koehne. Shrub to 2 m.; bark chestnut-brown, exfoliating: lvs. ovate-oblong to lance-ovate, 4–10 cm. long, long-acuminate, rounded or broad-cuneate at base, remotely denticulate-serrulate, glabrous, but conspicuously bearded in the axils of the veins beneath: fls. 3–3.5 cm. broad, scarcely fragrant, usually in 5-fld. racemes; pedicels glabrous, the lower 5–15 mm. long; calyx glabrous; sepals lance-ovate; style divided ⅓–¼, nearly as long as stamens. Fl.vi. S.H.1:f.238g(l). Himal. Cult. 1888. Zone V.—Upright shrub similar to *P. coronarius* with larger pure white and scarcely fragrant fls.

18. **P. pekinénsis** Rupr. Shrub to 2 m.; young brts. quite glabrous, often purplish; bark chestnut-brown, rarely grayish brown, exfoliating: lvs. oblong-ovate, 2.5–5 cm., on shoots to 8 cm. long, long-acuminate, cuneate at base, remotely serrulate-denticulate, quite glabrous or slightly bearded in the axils beneath and grayish green, usually 3-nerved; petioles slender, 2–10 mm. long, like the nerves beneath purplish: fls. 2.5–3 cm. across, creamy white, slightly fragrant, in 5–7-, rarely 9-fld., dense and glabrous racemes; lower pedicels 2–5 mm. long; calyx pale yellowish green, sometimes tinged purplish; petals oval; style about as long as stamens, usually divided only at apex. Fl.vi. S.H.1:f.237p-r,238e-f. S.L.291(h). (*P. coronarius* var. *p.* Maxim., ?*P. rubricaulis* Carr.) N. China to Korea. Intr. 1883. Zone IV.—Var. **brachybótrys** Koehne. Bark more often grayish brown and less readily exfoliating; young brts. sparingly strigose; lvs. sparingly strigose usually on both sides, at least those on the shoot; petioles usually green: racemes usually 5-fld., short and dense. (*P. b.* Koehne.) Intr. 1892. Zone V.—A wide-spreading shrub with small lvs. and small slightly fragrant creamy-white fls.; the variety grows more upright.

19. **P. tenuifòlius** Rupr. & Maxim. Shrub to 2 m.; bark chestnut-brown or grayish brown, exfoliating; young flowering brts. sparingly pubescent, shoots glabrous or nearly so: lvs. ovate to oblong-lanceolate, 4–8, on shoots to 12 cm. long, acuminate, rounded or broad-cuneate at base, remotely denticulate-serrulate or dentate on shoots, glabrous except sparingly hairy on the veins beneath, usually 5-nerved at base, thin, sometimes tinged violet when unfolding: fls. 2.5–3 cm. across, scarcely fragrant, in 5–7-fld. racemes; pedicels pubescent, the lower about 5 mm. long; calyx glabrous, sepals pale greenish white; style glabrous, divided about ½. Fl.vi. S.H.1:f.238m-n(l). (*P. coronarius* var. *t.* Maxim.) Manch. to Korea. Cult. 1890. Zone V or IV?—Shrub with spreading slender brs. and rather large thin lvs., like the following of no particular ornamental merit.

20. **P. Schrénkii** Rupr. Very near the preceding species, but of more vigorous and upright habit; young brts. more or less hairy, flowering brts. often with minute black warts: young lvs. not violet, at maturity of firm texture: fls. 3–3.5 cm. across in 5–7-fld. racemes; rachis and pedicels more densely pubescent with spreading hairs; calyx often hairy along the nerves ending at the base of the calyx-lobes; style more or less pilose at base, rarely

glabrous. Fl.vi. S.H.1:f.238c(l). Nakai. Veget. Diamond Mts., t.3,t.f.f(c). (*P. coronarius* var. *mandschuricus* Maxim., *P. mandshuricus* Nakai.) Manch. to Korea. Intr. about 1874. Zone V or IV?—Var. **Jáckii** Koehne. Lvs. sparingly hairy below: brts., rachis and pedicels more densely pubescent; calyx pubescent toward the base. (*P. lasiogynus* Nakai.) Korea, N. China. Intr. 1905. Zone V.

21. **P. coronàrius** L. Shrub to 3 m.; young brts. glabrous or slightly pilose; bark chestnut-brown, exfoliating: lvs. ovate to ovate-oblong, 4–8 cm. long, acuminate, broad-cuneate or rounded at base, remotely denticulate or dentate, glabrous except bearded in the axils of the veins beneath and sometimes hairy on the veins: fls. 2.5–3.5 cm. across, creamy-white, very fragrant, in 5–7-fld. racemes; pedicels glabrous or pubescent, the lower 5–10 mm. long; calyx glabrous, rarely sparingly pubescent; style usually divided about ½. Fl.vi. R.I.24:t.154(c). B.M.391(c). Gn.58:7(h). (*P. pallidus* Hayek.) S. Eu.: Italy to Cauc. Cult. 1560. Zone IV.—Var. **aùreus** Rehd. Lvs. bright yellow when young, later greenish yellow. Gn.15:476,t(c). (*P. c. fol. aureis* hort.) Orig. before 1878.—Var. **variegàtus** West. Lvs. bordered creamy white. Orig. before 1770.—Var. **dúplex** West. A semidouble or double form of dwarf habit; fls. often solitary. S.O.1:t.60(c, as *P. nanus*). (*P. c.* var. *fl. pleno* Loud.) Orig. before 1770.—Var. **deutziaeflòrus** Rehd. A double form with narrow acutish petals; racemes 3–5-fld.; pedicels glabrous. (*P. c.* var. *d. plenus* Hartwig.)—Var. **primulaeflòrus** Nichols. A double form with broad petals. R.H.1870:305. Other double-fld. forms are *P. c. dianthiflorus, rosaeflorus, multiflorus plenus* (Gn.15:476,t[c]).—Var. **salicifòlius** Jacques. Lvs. lanceolate, 5–10 cm. long and 1.5–2 cm. broad, more or less curved. S.H.1:f.238l(l).—Var. **pumilus** West. Dwarf dense shrub; brts. and lvs. on the veins beneath sparingly pubescent: lvs. smaller. (*P. nanus* Mill., *P. c.* var. *nanus* Schrad.)—Very popular and much planted for its fragrant fls.

P. c. × *pubescens* = *P. nivalis;* see under No. 6.—*P. c.* × *inodorus* or *grandiflorus* = *P. Zeyheri;* see No. 22.—*P. c.* × *Gordonianus* = *P. floribundus;* see No. 23.—*P. c.* × *laxus* = *P. Falconeri;* see No. 24.—*P. c.* × *microphyllus* = *P. Lemoinei;* see No. 31.

22. × **P. Zeÿheri** Schrad. (*P. coronarius* × *inodorus* or *grandiflorus*.) Spreading shrub to 2 m., glabrous; bark chestnut-brown, exfoliating: lvs. ovate or elliptic-ovate, 4–7, or on shoots to 10 cm. long, acuminate, remotely denticulate, rarely nearly entire, on shoots remotely dentate, glabrous except pubescent beneath along the veins near base or only bearded: fls. 3.5–5 cm. across, cup-shaped, in 3–5-fld. racemes; pedicels about 5 mm. long; sepals lance-ovate; petals broad-oval; style about as long as stamens, divided ⅓ or sometimes nearly to the base; stigmas about as large as stamens. Fl.vi. Orig. about 1820. Zone V.—Var. **Kochiànus** Rehd. Lvs. elliptic-ovate to lance-ovate, sparingly pubescent on the veins or bearded beneath: fls. 3.5–4 cm. across; style longer than stamens, divided about ⅓. (*P. K.* Koehne.)—Var. **umbellàtus** Rehd. Fls. 3–5 cm. across, in 7–15-fld. cymes; stigmas as broad and often longer than anthers. (*P. u.* Koehne.)—Shrub with spreading and arching brs. bearing large cup-shaped pure white and slightly fragrant fls.—See also *P. maculiflorus* under No. 35.

23. × **P. floribúndus** Schrad. (*P. coronarius* × ?*Gordonianus*.) Shrub to 3 m.; bark chestnut-brown, exfoliating: lvs. ovate or elliptic-ovate, 3–7, on shoots to 12 cm. long and often broad-ovate and very coarsely toothed, acuminate, broad-cuneate or rounded at base, rather coarsely and irregularly toothed, pubescent beneath: fls. 3.5–4 cm. across, slightly fragrant; pedicels and calyx glabrous or sparingly hairy; the lower pedicels 1–2 cm. long; style

divided about ½, as long or shorter than stamens. Fl.vi. Orig. before 1828. Zone V.

24. × **P. Falcòneri** Sarg. (*P. coronarius* ×? *laxus*). Shrub to 2.5 m.; nearly glabrous; bark chestnut-brown, exfoliating: lvs. ovate-lanceolate, to oblong-lanceolate, 3–5, on shoots to 8 cm. long, long-acuminate, cuneate at base, minutely denticulate or nearly entire, glabrous beneath except bearded in the axils: fls. about 3 cm. across, fragrant, in 3–5-fld. racemes or occasionally in 7-fld. cymes; lower pedicels 1–1.5 cm. long, sometimes articulate and occasionally branched; sepals lance-ovate; petals oblong, acutish; stamens rather few, often sterile; style longer than stamens, deeply divided, with narrow stigmas. Fl.vi. G.F.8:497. B.C.5:2581. Orig. before 1880. Zone V.—Tall shrub of graceful habit with numerous rather small fragrant fls.

Group 4. Speciosi Koehne. Bark brown, exfoliating: lvs. over 3 cm. long: fls. 1–3, rarely 5, usually large and cup-shaped; style longer than stamens, divided above; stigmas longer and broader than anthers.

25. **P. lâxus** Schrad. Shrub to 1.5 m.; young brts. glabrous: lvs. elliptic-ovate to oblong-lanceolate, 3–6 cm. long, on shoots to 8 cm., gradually acuminate, cuneate at base, remotely denticulate, sometimes nearly entire, usually glabrous above, with scattered strigose hairs beneath, usually more or less pendulous and curved, subchartaceous: fls. 1–3, scentless, 3–4 cm. across; petals obovate to elliptic; lateral pedicels 5–10 mm. long, glabrous like the calyx. Fl.vi. P.F.2:102 (as *P. satsumi*). (*P. grandiflorus* var. *l.* Torr. & Gray, *P. speciosus* Schrad., *P. undulatus* Kirchn.) Ga. Cult. 1825. Zone V.—Var. **strigòsus** Rehd. Lvs. densely strigose beneath and sometimes sparingly so above. (*P. inodorus s.* Beadle.) S. C. Not yet intr.—Spreading shrub with arching brs., small pendulous lvs. and large fls.

P. l. × *verrucosus* = *P. congestus;* see under No. 7.—*P. l.* × *pubescens* = ***P. pendulifolius;*** see under No. 6.

26. **P. inodòrus** L. Shrub to 3 m.: lvs. ovate, 3–6, on shoots to 10 cm. long, acute or acuminate, rounded at base, rarely broad-cuneate, entire or remotely denticulate, glabrous and lustrous above, glabrous beneath except bearded in the axils or sometimes sparingly strigose on the nerves, subchartaceous; petiole 2–3 mm. long: fls. 1–3, cup-shaped, 4–5 cm. across; pedicels short; calyx glabrous; sepals ovate, short-acuminate; petals orbicular-obovate. Fl.vi. B.M.1478(c). N. C. to Ga. and Miss. Intr. 1738. Zone V.—Handsome shrub with arching brs., lustrous dark green lvs. and large pure white cup-shaped fls.

P. i. × *coronarius* = *P. Zeyheri;* see No. 22.

27. **P. grandiflòrus** Willd. Shrub to 3 m.; lvs. elliptic-ovate to oblong-ovate, 4–7, on shoots to 12 cm. long, acuminate, cuneate or rounded at base, remotely denticulate or dentate, rather dull dark green above, glabrous or sparingly strigose beneath, rather thin; petiole 3–5 mm. long: fls. 4.5–5.5 cm. across; sepals lance-ovate; petals orbicular-obovate to oval. Fl.vi. S.B.II.1:8(c). Gn.89:653(h). (*P. inodorus* var. *g.* Gray, *P. gloriosus* Beadle.) N. C. and Tenn. to Fla. and Ala. Intr. 1811. Zone V.—Similar to the preceding species, but lvs. larger and less lustrous and fls. slightly four-cornered in outline.

P. g. × ? *Gordonianus* = **P. spléndens** Rehd. Similar to No. 28, but nearly glabrous: fls. usually 5; calyx glabrous; stigmas as broad as anthers, longer. H.B. 1923:340(h). Gn.M.33:39(h). Orig. before 1900.—*P. g.* × *coronarius* = *P. Zeyheri;* see No. 22.—*P. g.* × *pubescens* = *P. magnificus;* see No. 28.—*P. g.* × *Lemoinei* = *P. cymosus;* see No. 33.

28. × **P. magnìficus** Koehne. (*P. grandiflorus* × *pubescens.*) Large spreading shrub: lvs. large, pubescent beneath: fls. about 5 cm. across, in

3–5-fld. racemes, sometimes in cymes; lower pedicels 5–15 mm. long; calyx pubescent; style as long as stamens; stigmas broader than anthers. ?B.R. 2003(c), as *P. grandiflorus*). Orig. unknown.

29. **P. flòridus** Beadle. Shrub to 3 m.; similar to *P. grandiflorus*, but lvs. sparingly pubescent or glabrous above, rather densely pubescent beneath: fls. 1–3, about 5 cm. across; pedicels and calyx densely villous. Fl.VI. (*P. speciosus* Rydb., not Schrad.) N. C. and Ga. Intr. 1906. Zone V.—Var. **Faxònii** Rehd. Resembling *P. laxus* in habit and shape of lvs.; lvs. and fls. smaller. Cult. 1917.

Group 5. MICROPHYLLI Koehne. Lvs. small, usually less than 2 cm. long: fls. 1–3; style wholly and stigmas usually partly connate.

30. **P. microphýllus** Gray. Shrub to 1.5 m.; bark chestnut-brown, exfoliating; young brts. appressed-pubescent at first, soon glabrous and lustrous red-brown: lvs. very short-petioled, elliptic-ovate to oblong-lanceolate, acute, broad-cuneate at base, entire, lustrous and glabrous or strigose above, glaucescent and strigose beneath: fls. usually solitary, 2–2.5 cm. across, exquisitely fragrant; calyx glabrous or slightly strigose; pedicels 2–5 mm. long, strigose; style slightly shorter than stamens. Fl.VI–VII. Gn.40:288,t(c). G.C.III.51:225. G.W.19:561(h). Colo. to N. Mex. and Ariz. Intr. 1883. Zone V.—A graceful upright shrub with small lvs. and numerous white fls. of pine-apple-like fragrance.

Two closely related species are the following: **P. argyrócalyx** Wooton. Lvs. elliptic to ovate-oblong, on shoots sometimes to 4 cm. long, densely silky-strigose beneath; calyx white-tomentose. Fl.VII–VIII. (*P. ellipticus* Rydb.) N. Mex. Intr. 1916. Zone V.—**P. serpyllifòlius** Gray. Straggling shrub to 1 m.; bark pale gray-brown, not exfoliating: lvs. obtuse or obtusish, hirsute-strigose above, densely strigose beneath: fls. solitary, nearly sessile; style much shorter than stamens, nearly wanting. N. Mex., w. Tex. Intr. 1917. Zone V.

31. × **P. Lemoìnei** Lemoine. (*P. microphyllus* × *coronarius*.) Lvs. ovate to ovate-lanceolate, 1.5–4 cm. long, on shoots ovate, to 6 cm., acuminate, entire or with 1–4 small teeth on each side, glabrous above, sparingly strigose chiefly on the veins beneath: fls. 2.5–4 cm. across, very fragrant, in 3–7-fld. racemes; calyx glabrous; lower pedicels 2–5 mm. long; style shorter than stamens, connate to the apex or divided ½. G.F.2:617. Orig.1884. Zone V. —The following horticultural varieties belong here: "Avalanche" (G.C.III. 21:89. M.G.11:293;22:379).—"Boule d'argent," with double fls. (G.C.III. 18:18;23:331).—"Candelabre" (M.G.11:294).—"Erectus" (M.G.17:383).— "Manteau d'hermine," with double fls., sometimes in cymes.— "Mont Blanc" (Gs.1:64.—The forms of this hybrid are very handsome shrubs of different habit with rather small lvs. and very fragrant fls. produced in great profusion. —By crossing *P. Lemoinei* with other species and hybrids a bewildering variety of forms has been raised which may be classed under the following names:

32. × **P. polyanthus** Rehd. (*P. Lemoinei* × ? *insignis*.) Bark brown, tardily exfoliating: lvs. ovate, 2–5 cm. long, usually entire, acuminate, on shoots sometimes with a few teeth, strigose-pubescent beneath: fls. about 3.5 cm. across, in cymose infl. or in racemes with articulate pedicels; calyx strigose-pubescent. (*P. Lemoinei multiflorus* Schelle.) Orig. before 1901.—Here belong "Gerbe de neige" (type), "Favorite" and "Pavillon blanc" (Gs.1:64).

33. × **P. cymòsus** Rehd. (*P. Lemoinei* × ? *grandiflorus* or closely related forms.) Bark exfoliating: Lvs. 4–10 cm. long, remotely dentate or denticulate, pubescent beneath particularly near the base of the veins and

along the veins or nearly glabrous: fls. 5–6 cm. across, double or single, in 3–9-fld. cymes or in racemes with the lower pedicels branched or articulate; calyx glabrous; sepals lance-ovate; style about as long as stamens, usually divided to the base. Orig. before 1903.—Here belong "Conquête" (G.W.17: 102), the type.—"Bannière," with semidouble fls.—"Mer de glace" (G.W. 17:102. Lemoine, Cat.176,t.).—"Norma," with single or double fls.—"Nuée blanche."—"Rosace."—"Voie lactée" (Gn.82:267. J.H.28:f.117. G.M.55: 554.).—Also "Perle blanche" may be referred here, though it has a pubescent calyx.

34. × **P. virginàlis** Rehd. (*P. Lemoinei* × ? *nivalis plenus.*) Bark brown exfoliating or gray-brown and little exfoliating; lvs. generally ovate, 4–6, on shoots to 8 cm. long, remotely dentate or denticulate, pubescent beneath: fls. double or semidouble, in 3–7-fld. racemes; calyx densely pubescent, rarely glabrescent; style shorter than stamens, divided ½. Orig. before 1910.—Here belong the following forms: "Virginal" (type) with exfoliating bark and semidouble fls. in 5–7-fld. racemes. G.C.III.64-3(h). Gn.82:267. R.H. 1910:408, 409(h).—"Argentine," with double fls. usually in 3's.—"Glacier," with rather small double fls. in dense 5–7-fld. racemes.—Also "Bouquet blanc" may be referred here, though the calyx is scarcely pubescent. J.H.28:f.116. G.W.17:101.

35. × **P. purpúreo-maculàtus** Lemoine. (*P. Lemoinei* × *P. Coulteri.*) Young brts. pubescent: lvs. ovate, 8–20 mm. long, acute, entire or with 1–2 teeth (or more in some vars.), strigose-pubescent on both sides; petioles 2 mm. long: fls. 1–3, about 3 cm. across, white, with a purple spot at the base of each petal; calyx sparingly pubescent; style connate, glabrous, shorter than the stamens; stigmas capitate, free. B.M.8193(c). Gn.82:267;87:396. Orig. before 1902. Zone VII?—Here belong: "Etoile rose," "Fantaisie" (*P. phantasia* A. H. Moore), "Nuage rose," "Oeil de pourpre," "Romeo," "Sirène," "Surprise," "Sybille."

Another form with red spots at the base of the petals is **P. maculiflòrus** Koehne, but the spots are rather pale and the plant does not show the slightest influence, of *P. Coulteri*, but resembles *P. coronarius*, though in the style which is longer than the stamens and in the broad stigmas it approaches *P. grandiflorus;* it may be a form of *P. Zeyheri.*

Group 5. Gemmati Koehne. Buds free, not inclosed in the base of the petiole: fls. 1–3, or in racemes; styles and often the stigmas connate, pubescent or glabrous.

36. **P. hirsûtus** Nutt. Shrub to 2.5 m.: bark brown, exfoliating; young brts. pubescent: lvs. ovate to oblong-ovate, 3–8 cm. long, acuminate, cuneate or rounded at base, serrate, short-pubescent or nearly glabrous above, densely grayish pubescent beneath strongly 3-nerved: flowering brts. short, usually only with 1 pair of leaves; fls. usually 3, rarely 1, or 4–5, creamy-white, scentless, 2–3 cm. across; pedicels pubescent, the lower ones 5–20 mm. long; calyx pubescent; petals obovate; sepals triangular-ovate; style glabrous; stigmas oblong, partly united. Fl.v–vi. B.R.24:14(c). B.M.5334(c). S.L. 289(h). (*P. Godohokeri* Kirchn.)—N. C. and Tenn. to Ga. and Ala. Intr. 1820. Zone V.—Straggling shrub with rather small scentless fls.; one of the least ornamental species, but the earliest to bloom.

The following two species of this group are in cult., but scarcely hardy within our area: **P. Coùlteri** S. Wats. Lvs. ovate to ovate-oblong, 2–4 cm. long, acute or acuminate, remotely denticulate, pubescent above, white-tomentose beneath: fls. solitary, about 3 cm. across, calyx white-tomentose, petals with a red spot at base; style hairy. G.F.1:233. (*P. mexicanus* var. *C.* Bean.) Mex. Intr. about 1840? —**P. mexicànus** Schlecht. Similar, but lvs. larger, sparingly strigose below; calyx short-villous; petals white, not spotted. B.R.28:38(c). G.C.III.34:218. Mex. Cult. 1842.

3. **JAMÈSIA** Raf. Deciduous shrubs: brs. with exfoliating bark and solid pith; terminal bud with 2, lateral with 1 pair of outer scales, densely pubescent: lvs. opposite, short-petioled, serrate, penninerved: fls. perfect, in terminal cymes; sepals 5; petals 5, convolute, obovate-oblong, pubescent inside; stamens 10; ovary incompletely 3–5-celled, nearly superior; ovules numerous; styles 3–5, distinct, about as long as stamens, persistent: fr. a caps., half-inferior, 3–5-valved, little longer, or shorter than the upright sepals; seeds numerous. (After Dr. Edwin James, botanical explorer of the Rocky Mts.; 1797–1861.) Syn.: *Edwinia* Heller. Three species in W. N. Am.

J. americàna Torr. & Gray. Shrub to 1 m., rarely to 2.5 m. tall; brts. pubescent while young: lvs. ovate to elliptic, 1.5–6 cm. long, acute, serrate, rugose and slightly pubescent above, grayish or whitish tomentose beneath; petioles 2–15 mm. long: fls. white, sometimes pinkish outside, slightly fragrant, about 1.5 cm. across, in many-fld. cymes, 2–4 cm. high; sepals ovate-lanceolate, acute, much shorter than the petals; stamens and styles somewhat shorter than petals; caps. about 4 mm. long. Fl.v–vi. BM.6142(c). Gn.63:105. Gt.53:231, 232. L.I.t.6. S.L.234(h). (*Edwinia a.* Heller.) Wyo. to Utah and N. Mex. Intr. 1862. Zone V.—Var. **ròsea** Purp. Fls. pink. Cult. 1905.—Attractive upright shrub, though not showy, with rather small dull green lvs. turning orange and scarlet in autumn in sunny positions and with clusters of white fls. in late spring.

4. **FÉNDLERA** Engelm. & Gray. Deciduous rarely subevergreen shrubs: buds minute, with 1 or 2 pairs of outer pubescent scales; brts. striped, pale, bark of older branches fibrous: lvs. subsessile, opposite, entire, 1–3-ribbed, estipulate: fls. 1–3, on short lateral brts., pedicelled, perfect; sepals 4, valvate, longer than the calyx-tube; petals 4, clawed, with rhombic-ovate, erose-ciliate blades; stamens 8; filaments flattened at the top, with narrow upright appendages slightly exceeding the anthers; ovary half-superior, 4-celled, many-ovuled; styles 4, distinct: capsule 4-valved, longer than the persistent sepals; seeds 5–7 mm. long, oblong-triangular, narrowly winged. (After August Fendler, a German naturalist, botanical explorer of New Mexico; 1813–1883.) Three species from Colo. to Mex.

A. Lvs. green and strigose or nearly glabrous beneath.....1. *F. rupicola*
AA. Lvs. grayish or whitish and strigose and tomentulose beneath.....2. *F. Wrightii*

1. **F. rupícola** Gray. Shrub to 2 m.; brts. minutely pubescent while young: lvs. elliptic to oblong or oblong-lanceolate, 1–3 cm. long, acute or obtusish, usually short-strigose and rough above, rarely nearly glabrous, sparingly or sometimes densely strigose beneath, chartaceous: fls. usually solitary, 3–3.5 cm. across, white or slightly tinged rose outside; sepals pubescent or nearly glabrous; stamens upright, about half as long as the spreading petals: caps. light brown, 1–1.5 cm. long. Fl. v–vi. Gray, Pl. Wright.t.5(excl. f. 2,6,7). Tex. and N. Mex.—Var. **falcata** Rehd. Lvs. larger, 2–4 cm. long, narrow-elliptic to linear-lanceolate, usually nearly glabrous, often falcate: fls. often to 4 cm. across. (*F. f.* Thornber.) N. Mex. to Ariz. and Colo. Intr. 1916. Zone V?

2. **F. Wrìghtii** Hell. Similar to the preceding: lvs. narrow-elliptic to lanceolate or narrow-oblong, 5–20 mm. long, scabrid above, grayish white and densely strigose and tomentulose beneath: fls. usually somewhat smaller; pedicels and calyx densely pubescent: caps. about 1 cm. long. Fl.v–vi. B.M.7924(c). G.F.2:113. G.C.III.36:410;73:177. G.W.19:562(h). (*F. rupicola* var. *W.* Gray, *F. rupicola* Sarg., not Gray.) N. Mex. and w. Tex. to

n. Mex. Intr. 1879. Zone (V).—Like the preceding a handsome graceful shrub with slender often arching brs. bearing in late spring numerous white fls. resembling in shape a maltese cross.

The allied genus **Fendlerélla** Heller is easily distinguished by its smaller 5-merous fls. in small cymes. **F. utahénsis** Hell. (*Whipplea u.* S. Wats.) distributed from Utah and Nev. to N. Mex. is a low upright shrub of no ornamental merit and apparently not in cult.

5. **DEÙTZIA** Thunb. Deciduous or rarely evergreen shrubs; brts. hollow, with usually brown and exfoliating bark; buds with many imbricate scales, glabrous or nearly so: lvs. opposite, short-petioled, serrate, estipulate: fls. in panicles or in cymes, rarely solitary, usually terminal on lateral brts., white, sometimes pink or purplish, epigynous; calyx-teeth 5, petals 5; stamens 10, rarely more, shorter than petals; filaments usually winged and toothed at apex, the 2 whorls often of different size and shape; styles 3–5, distinct: caps. 3–5-valved, with numerous minute seeds. (After Joh. van der Deutz, patron of Thunberg.) Including *Neodeutzia* Small. About 50 species in E. Asia and the Himal., 2 in Mex.

A. Petals valvate in bud.
  B. Fls. in panicles or racemes; calyx-lobes shorter than the tube.
    C. Filaments winged and toothed near apex (sometimes subulate in Nos. 2 and 3).
      D. Lvs. glabrous or nearly so beneath (sparingly stellate with 4–6-rayed hairs in Nos. 2 and 3).
        E. Infl. an elongated panicle or raceme; fls. white.....1. *D. gracilis*
        EE. Infl. a broad loose panicle; fls. usually pinkish.
          F. Calyx-teeth lanceolate.....2. *D. rosea*
          FF. Calyx-teeth triangular-ovate.....3. *D. carnea*
      DD. Lvs. stellate-pubescent beneath with 10–15-rayed hairs.
        E. Calyx-teeth shorter than the tube; petals nearly upright.
          F. Lvs. crenate-denticulate, green and stellate-pubescent below: panicle narrow. 4. *D. scabra*
          FF. Lvs. sharply serrate.
            G. Panicle narrow: lvs. with close white tomentum beneath...5. *D. hypoleuca*
            GG. Panicle broad and loose; lvs. grayish or green beneath, with simple hairs on the veins.....6. *D. Schneideriana*
        EE. Calyx-lobes about as long as tube.....8. *D. magnifica*
    CC. Filaments, at least the longer ones subulate; panicle loose and broad: lvs. on the floral brts. subsessile; hairs with 4–5 rays.....7. *D. Sieboldiana*
  BB. Fls. in corymbs or cymes, sometimes solitary.
    C. Infl. many-fld. or several-fld.
      D. Calyx-teeth shorter than the tube, broad-ovate or triangular: fls. white, rather small.....9. *D. setchuenensis*
      DD. Calyx-teeth as long or longer than the tube, ovate-lanceolate or lanceolate.
        E. Fls. pink or purplish outside (see also Nos. 22 and 23).
          F. Anthers of the inner stamens borne on the inner side of the broad filaments.
            G. Lvs. green and sparingly stellate beneath, with 4–6-rayed hairs. 10. *D. purpurascens*
            GG. Leaves grayish or whitish beneath, densely stellate with 8–12-rayed hairs. 13. *D. longifolia*
          FF. Anthers borne at the end of the filaments: lvs. slightly stellate and green beneath.....12. *D. elegantissima*
        EE. Fls. white.
          G. Inner filaments linear-oblong, exceeding the anthers: lvs. soft-pubescent beneath.....12. *D. glomeruliflora*
          GG. Inner filaments with 2 teeth near apex: lvs. with close stellate tomentum beneath.
            H. Infl. rather dense; the pedicels about 5 mm. long.....14. *D. discolor*
            HH. Infl. loose; the pedicels about 1 cm. long: lvs. usually with simple hairs along the midrib.....15. *D. Vilmorinae*
    CC. Infl. 1–3-fld.; filaments with long recurved teeth; fls. large, white..16. *D. grandiflora*
AA. Petals imbricate in bud (or partly imbricate in Nos. 18, 21–23).
  B. Lvs. soft-pubescent beneath with spreading hairs.
    C. Stamens subulate: lvs. densely soft-pubescent.....17. *D. mollis*
    CC. Stamens mostly abruptly contracted below the apex: lvs. with mixed pubescence beneath.....18. *D. Wilsonii*
  BB. Lvs. stellate-pubescent or glabrous beneath.
    C. Lvs. green beneath, sparingly stellate or nearly glabrous.
      D. Petals always valvate in bud; infl. corymbose.
        E. Lvs. sharply serrulate; hairs beneath 6–9-rayed, at least the outer filaments subulate.....19. *D. parviflora*

EE. Lvs. crenate-serrulate; the hairs beneath 8–12-rayed: stamens all dentate. 20. *D. corymbosa*
DD. Petals partly valvate and partly imbricate in bud: infl. panicle-like; filaments dentate.
E. Fls. white ..... 21. *D. Lemoinei*
EE. Fls. pinkish outside.
F. Fls. about 1.5 cm. across, in many-fld. infl. ..... 22. *D. maliflora*
FF. Fls. about 2 cm. across, in 7–15-fld. infl. ..... 23. *D. kalmiaeflora*
CC. Lvs. glaucous and quite glabrous beneath: fls. white ..... 24. *D. hypoglauca*

Sect. I. EUDEUTZIA Engl. Petals valvate in bud.

Group 1. LATISEPALAE Schneid. (*Scabrae* Rehd.) Infl. paniculate; calyx-teeth shorter than tube; petals more or less upright; filaments with teeth not exceeding the anthers or subulate; styles as long or slightly shorter than petals.

1. **D. grácilis** Sieb. & Zucc. Shrub to 2 m.; brts. with yellowish gray close bark: lvs. oblong-lanceolate, 3–6 cm. long, rarely to 8 cm., long-acuminate, broad-cuneate or rounded at base, unequally serrate, with scattered stellate hairs above, nearly glabrous and green beneath: fls. white, 1.5–2 cm. long, in upright panicles or racemes, 4–9 cm. long; calyx slightly scaly, with short triangular, greenish white lobes deciduous in fr.; petals elliptic to oblong; filaments with short spreading teeth. Fl.v–vi. S.Z.1:t.8(c). F.S.6:t.611(c). Gn.39:200. Japan. Intr. about 1840. Zone V.—Var. **aûrea** Schelle. Lvs. yellow. There are also some variegated forms.—Graceful free-flowering shrub with slender often arching brs.; used for forcing.

D. g. × *Sieboldiana* = **D. candelábrum** Rehd. Brts. grayish brown: lvs. usually ovate-lanceolate, serrulate, scabrid above, thinly covered beneath with 3–5-rayed hairs; petioles of flowering brts. about 1 mm. long: fls. 1.5 cm. across, in many-fld. panicles 6–11 cm. long; filaments toothed. R.H.1908:174. M.G.22: 378(h). R.B.33:372(h). (*D. gracilis c.* Lemoine.) Orig. before 1907.—Var. **fastuòsa** Rehd. (*D. gracilis f.* Lemoine) is scarcely different.—Var. **erecta** Rehd. (*D. gracilis e.* Lemoine) has shorter panicles and smaller fls.; the longer filaments usually gradually narrowed below the apex. Orig. before 1911.—Similar to *D. gracilis* in appearance, but panicles broader and denser.—*D. g.* × *parviflora* = *D. Lemoinei*; see No. 21.

2. × **D. rôsea** Rehd. (*D. gracilis* × *purpurascens.*) Brts. with brown, usually exfoliating bark: lvs. ovate-oblong to ovate-lanceolate, sharply serrulate, with scattered stellate hairs, those below with 4–6 rays; petioles 4–5 mm. long: fls. open-campanulate, about 2 cm. across, pinkish outside, in short panicles; calyx-teeth lanceolate, longer than the tube; filaments usually slightly toothed; styles usually longer than the stamens. F.E.30:423. Gn.M. 25:229. G.27:274. (*D. gracilis r.* Lemoine.) Orig. before 1898. Zone (V).—Var. **campanulàta** Rehd. Fls. white, about 2.5 cm. across; sepals lanceolate, purplish, petals broader; filaments strongly toothed. G.28:485. Gn.M.25:229. (*D. gracilis c.* Lemoine.) Orig. before 1899.—Var. **venústa** Rehd. Fls. white; filaments toothed; sepals deltoid, green. G.27:275. (*D. gracilis v.* Lemoine.) Orig. before 1898.—Var. **multiflòra** Rehd. Fls. white; filaments toothed; sepals lanceolate. (*D. gracilis m.* Lemoine.)—Var. **carmínea** Rehd. Fls. purplish outside; filaments strongly toothed; sepals deltoid, purplish. (*D. gracilis c.* Lemoine.) Orig. before 1900.—Var. **eximia** Rehd. Fls. slightly pinkish outside; filaments short, strongly toothed; sepals deltoid, purplish. (*D. gracilis e.* Lemoine.) Orig. before 1901.—Var. **floribúnda** Rehd. Fls. slightly pink outside, in rather dense upright panicles; stamens strongly toothed; sepals lanceolate. (*D. discolor f.* Lemoine.) J.P.1902:312(h). Orig. before 1901.—Var. **grandiflòra** Rehd. Similar, but infl. less dense. Gn.M. 25:229. (*D. discolor g.* Lemoine.)

D. r. × *Vilmorinae* = *D. excellens*; see under No. 15.

3. × **D. cárnea** Rehd. (*D. rosea grandiflora* × *Sieboldiana.*) Brts. brown: lvs. ovate to oblong-ovate, 3–5 cm. long, acuminate, usually rounded

at base, sharply serrulate, with scattered stellate hairs on both sides; petioles 2–3 mm. long: fls. nearly 2 cm. across, pink outside, in loose upright panicles; sepals deltoid, purplish; stamens about as long as style, the filaments with short, sometimes obsolete teeth. (*D. discolor c.* Lemoine.) Orig. 1907.—Var. **stellàta** Rehd. (*D. discolor s.* Lemoine) differs chiefly in its narrower petals. –Var. **densiflòra** (*D. discolor d.* Lemoine) has white fls. slightly pinkish in bud and var. **làctea** Rehd. (*D. discolor l.* Lemoine) pure white fls.

4. **D. scábra** Thunb. Shrub to 2.5 m.; brts. with red-brown, rarely grayish brown, tardily exfoliating bark, stellate-pubescent while young: lvs. ovate to oblong-lanceolate, 3–8 cm. long, acute or obtusely acuminate, usually rounded at base, crenate-denticulate, dull green, stellate pubescent on both sides, beneath with 10–15-rayed hairs; petioles on flowering brts. about 2 mm. long: panicles upright, narrow, 6–12 cm. long, stellate-pubescent, often mixed with spreading hairs; fls. white or pinkish outside, 1.5–2 cm. long; calyx-teeth triangular, deciduous in fr.; petals oblong, nearly upright; filaments toothed below apex; the longer stamens nearly as long as petals; styles usually 3; caps. subglobose, about 5 mm. long. Fl.VI–VII. S.Z.1:t 6(c). B.M.3838(c). B.R.1718(c). Gn.37:315. (*D. crenata* Sieb. & Zucc., *D. dentata* Hort., *D. mitis* Hort.) Japan, China. Intr. 1822. Zone V.—Var. **angustifòlia** Voss. Lvs. oblong-ovate to ovate-lanceolate: infl. only with stellate hairs. (*D. crenata* var. *a.* Reg.)—Var. **marmoràta** Rehd. Lvs. spotted with yellowish white. (F. *aureo-variegata* Schneid.)—Var. **punctàta** Rehd. Lvs. sprinkled with white dots. (F. *albo-punctata* Schneid.)—Var. **Wàtereri** Rehd. Fls. white, tinted carmine outside. Add.8:t.264(c). G.C.III.39:340. (F. *punicea* Schneid., *D. crenata W.* Lemoine.)—Var. **plêna** Rehd. Fls. double, suffused with rosy purple outside. R.H.1867:70,t(c). F.S.17:t.1790;18:t.1850(c). (*D. crenata fl. pleno* Hort., *D. crenata* var. *p.* Maxim.) Here belongs "Pride of Rochester."—Var. **candidíssima** Rehd. Fls. pure white. G.C.II.18:173. A.F.6:263. (*D. crenata c. plena* Froebel, *D. hybrida Wellsii* Hort.)—Handsome popular shrub with a profusion of white, often purplish tinted fls. late in June.

D. s. × *Vilmorinae* = *D. magnífica;* see No. 8.

5. **D. hypoleûca** Maxim. Shrub to 1.5 m.; brts. slender, with brown exfoliating bark: lvs. elliptic-lanceolate to oblong-lanceolate, 3–6, on shoots to 9 cm. long, long-acuminate, usually broad-cuneate at base, serrulate, white-tomentose beneath; petioles about 2 mm. long; fls. white, in narrow upright panicles 4–8 cm. long, or sometimes in simple racemes; calyx-teeth triangular, acute, deciduous; petals oblong, 1–1.2 cm. long; stamens slightly shorter; filaments toothed below apex; styles usually 4–5, nearly as long as petals: capsule about 3 mm. long. Fl.v. (*D. discolor* Maxim., not Hemsl., *D. Maximowicziana* Makino.) Japan. Intr. 1915. Zone V?—Similar to the preceding, but slenderer and smaller in every part.

6. **D. Schneideriàna** Rehd. Shrub to 2 m.; brts. with brown, tardily exfoliating bark: lvs. elliptic-ovate to elliptic-oblong, 3–7 cm. long, acuminate, usually rounded at base, sharply serrulate, whitish or grayish tomentose beneath: fls. white in broad-pyramidal panicles; petals oblong; stamens slightly shorter, with strongly toothed filaments; styles usually 3: caps. about 6 mm. across. C. China.—Var. **laxiflòra** Rehd. Lvs. oblong-ovate to oblong-lanceolate, thinly stellate-pubescent and green beneath: panicles 4–8 cm. long and almost as broad at base, loose; petals 1.2–1.4 cm. long. Fl.VI–VII. Gn.M.27:21. C. China. Intr. 1907. Zone (V) VI.—Handsome free-flowering shrub, similar to *D. scabra*, but with broader and looser panicles.

7. **D. Sieboldiàna Maxim.** Shrub to 2 m.; brts. with brown exfoliating

bark: lvs. subsessile on flowering shoots, ovate to oblong-ovate, 3–6, on shoots to 8 cm. long, short-acuminate, rounded or subcordate at base, dentate-serrulate, rugose and scabrid above, green and stellate-pubescent beneath with 3–5-rayed hairs: panicles upright, broad-pyramidal and loose, 3–7 cm. long, stellate-pubescent and usually mixed with spreading hairs; fls. white, about 1.5 cm. across, with spreading elliptic-oblong petals; sepals triangular, acute, persistent; stamens slightly shorter than petals; the outer filaments without teeth, the inner often obscurely toothed; styles usually 3: fr.3–4 mm. across. Fl.VI. S.Z.1:t.7(c). G.C.III.36:244. B.S.1:487. (*D. scabra* Sieb. & Zucc., not Thunb.) Japan. Cult. 1890. Zone V.—Var. **Dippeliàna** Schneid. Lvs. of flowering brts. broad-elliptic or broad-ovate: infl. only with stellate pubescence; all filaments without teeth. Japan. Intr. about 1875. Zone V.—Usually low shrub with numerous upright loose panicles; less showy than the preceding species.

D. S. × *rosea* = *D. carnea;* see No. 3.—*D. S.* × *purpurascens* = *D. elegantissima;* see No. 11.—*D. S.* × *Lemoinei* = *D. candida;* see under No. 21.

8. × **D. magnífica** Rehd. (*D. scabra* × *Vilmorinae*). Lvs. ovate-oblong, 4–6, on shoots to 8 cm. long, rounded at base, sharply serrulate, scabrid above, grayish green and rather densely stellate-pubescent beneath with 10–15-rayed hairs: fls. white, double, in short, rather dense panicles 4–6 cm. long; calyx-teeth ovate or deltoid, nearly as long as the tube; petals oblong, acutish; styles usually 4. Fl.VI. G.M.53:108. F.E.31:322. (*D. crenata m.* Lemoine.) Orig. before 1910. Zone (V) VI.—Var. **formòsa** Rehd. (*D. crenata f.* Lemoine) has also double fls. while the following have single fls. and filaments with large ascending teeth.—Var. **latiflòra** Rehd. (*D. crenata l.* Lemoine.) Fls. nearly 4 cm. across, with spreading petals.—Var. **supérba** Rehd. (*D. crenata s.* Lemoine.) Fls. campanulate.—Var. **ebúrnea** Rehd. (*D. crenata e.* Lemoine.) Fls. campanulate, in rather loose panicles.—Var. **erécta** Rehd. (*D. crenata e.* Lemoine.) Fls. in dense panicles.—Similar to *D. scabra*, but the infl. shorter and broader and the filaments with larger ascending teeth.

Group 2. CYMOSAE Rehd. Fls. in loose corymbose cymes; sepals broad-triangular; filaments with large teeth, those of the inner stamens elongated above the anther.

9. **D. sétchuenénsis** Franch. Shrub to 2 m.; brts. with brown, tardily exfoliating bark: lvs. ovate-lanceolate to lanceolate, 2–4, on shoots to 8 cm. long, long-acuminate, usually rounded at base, scabrid above and sometimes with simple spreading hairs, grayish green beneath and densely stellate-pubescent with mostly 6-rayed hairs and mixed, particularly on the veins, with simple spreading hairs; petioles on the flowering brts. 2–4 mm. long: fls. 1–1.2 cm. across, white, in few- to many-fld. loose corymbs; petals elliptic, spreading; stamens upright, scarcely half as long as petals, the outer filaments with broad ascending teeth, the inner lanceolate exceeding the anther; styles 3, shorter than stamens. Fl.VI–VII. G.C.III.76:165(h). (*D. corymbiflora erecta* Lemoine.) C. and W. China. Intr. about 1893. Zone VI or VII.—Var. **corymbiflòra** Rehd. Lvs. broader and larger: fls. nearly 1.5 cm. across, in loose corymbs 5–10 cm. broad. B.M.8255(c). G.C.III.24:267(h). R.H. 1897:466(h),467. A.F.14:166(h). (*D. c.* Lemoine, *D. corymbosa* André, not R. Br.) Intr. with the type.—A species of rather loose and straggling habit, of distinct appearance, but less showy than most species and rather tender.

D. s. × *parviflora* = *D. myriantha;* see under No. 20.

Group 3. STENOSEPALAE Schneid. Fls. in corymbs; calyx-teeth elongated, as long or longer than the tube; filaments always toothed, the inner ones often elongated beyond the anther.

10. **D. purpurascens** Rehd. Shrub to 2 m.; brts. with brown exfoliating bark: lvs. oblong-ovate to oblong-lanceolate, 2–3.5, on shoots to 6 cm. long, acuminate, usually rounded at base, unequally serrulate, scabrid above, green and loosely stellate-pubescent beneath with 5–7-rayed hairs; petioles about 1–3 mm. long: fls. about 2 cm. across, purplish outside, in 4–10-fld. corymbs; sepals lanceolate, purplish, longer than tube; petals spreading, obovate or elliptic; stamens about ⅔ as long as petals; outer filaments with large teeth exceeding the anthers, the inner oblong, with the anther attached inside near the middle. Fl.v–vi. B.M.7708(c). G.C.III.2:45;26:45. G.F.7:287. R.H.1895:64,t(c). (*D. discolor* var. *p.* Franch.) W. China. Intr. 1888. Zone VI? or VII.—Spreading shrub with slender brs. and handsome star-shaped fls. more or less purple outside.

D. p. × *gracilis* = *D. rosea;* see No. 2.—*D. p.* × *Lemoinei* = *D. maliflora;* see No. 22.—*D. p.* × *parviflora* = *D. kalmiaeflora;* see No. 23.

11. × **D. elegantíssima** Rehd. (*D. purpurascens* × *Sieboldiana.*) Lvs. ovate to oblong-ovate, irregularly and sharply serrulate, sparingly stellate-pubescent beneath with 4–6-rayed hairs; petioles 1–2 mm. long: fls. nearly 2 cm. across, open, tinted rose inside and outside, in many-fld. loose corymbs; calyx-lobes lanceolate, purple, longer than tube; filaments with large ascending teeth. R.B.36:387. M.G.22:377,f.9. (*D. discolor e.* Lemoine.) Orig. before 1910.—Var. **fasciculàta** Rehd. (*D. discolor f.* Lemoine) is very similar and var. **arcuàta** Rehd. (*D. discolor a.* Lemoine) has white fls.—Similar to *D. purpurascens* but chiefly distinguished by its broader more abruptly acuminate lvs., shorter petioles, longer stamens with the inner filaments toothed at apex and by the more upright habit.

12. **D. glomeruliflòra** Franch. Shrub to 2 m.; bark of brts. brown, quickly exfoliating: lvs. ovate-oblong to lanceolate, 2–4, on shoots to 7 cm. long, acuminate, cuneate or sometimes rounded at base, sharply serrulate, pubescent above, grayish white below and soft-pubescent with 5–6-rayed hairs mixed with simple hairs on the veins; petioles 1–2 mm. long: fls. white, about 2 cm. across, in usually dense corymbs 3–5 cm. across; calyx-teeth lanceolate, as long or longer than tube, purple; petals elliptic; stamens about half as long as petals; the outer filaments with large ascending teeth, the inner oblong or lanceolate with the anther attached inside; styles about 4. Fl.v–vi. W. China. Intr. 1908. Zone (V) VI.—Shrub with slender arching brs. rather small lvs. and dense clusters of large white fls.; easily distinguished from the related species by the soft pubescence on the under side of the lvs.

13. **D. longifòlia** Franch. Shrub to 2 m.; brts. with brown or grayish brown exfoliating bark: lvs. oblong-lanceolate to lanceolate, or sometimes narrow lanceolate, 5–8, on shoots to 12 cm. long, long-acuminate, usually cuneate at base, serrulate, scabrid above, grayish green or whitish beneath and densely covered with stellate, 8–12-rayed hairs, on the veins often with simple spreading hairs; petioles 2–3 mm., on shoots to 8 mm. long: fls. 2–2.5 cm. across, tinted light purple, in many-fld. rather dense corymbs; calyx-teeth lanceolate, longer than tube; petals elliptic-oblong; stamens upright, outer filaments with large ascending teeth, the inner usually lanceolate with the anther attached inside, sometimes similar to the outer ones; styles usually 4, sometimes 5. Fl.vi. B.M.8493(c). G.C.III.51:409. Gn.76:243;88:589(h). Gn.M.27:21. W. China. Intr. 1901. Zone VI or VII.—Var. **Veitchii** Rehd. With larger more brightly colored fls. in dense corymbs. R.H.1915:536,t(c). G.C.III.51,suppl.1,f.11(h). J.H.40:f.53(h). (*D. V.* Wils.)—Var. **élegans** Rehd. Fls. nearly 2 cm. across, rosy-purple outside, in rather loose corymbs

along slender arching brs. Intr. 1908. Zone (V).—A handsome and striking shrub of vigorous habit with rather large lvs. and large purplish fls. in dense corymbs.

14. **D. díscolor** Hemsl. Upright shrub to 2 m.; bark of brts. red-brown or chestnut-brown, exfoliating: lvs.oblong-lanceolate, 3–7, on shoots to 10 cm. long, acuminate, cuneate at base, denticulate-serrulate, scabrid above, grayish green or whitish beneath and densely covered with 10–15-rayed hairs; petioles 2–3 cm. long: fls. about 2 cm. across, white, rarely slightly pinkish, in usually dense many-fld. corymbs; pedicels 3–6 mm. long; calyx-lobes lanceolate or triangular-lanceolate, about as long as tube; petals elliptic; stamens about half as long as petals, the large teeth of the filaments usually not reaching the base of the anthers, but on the inner filaments sometimes equaling the anthers, rarely the inner filaments prolonged beyond the insertion of the anthers; styles usually 3, longer than the stamens. Fl.vi. C. China. Intr. 1901. Zone (V) VI.—Var. **màjor** Veitch. Fls. about 2.5 cm. across, slightly rose-tinted outside. B.S.1:482. G.30:307(h). R.B.32:174(h). —Handsome shrub with rather large lvs. and large white fls. in dense corymbs.

D. d. × *mollis* = *D. Wilsonii;* see no. 18.

Closely related species are: **D. refléxa** Duthie. Lvs. with simple hairs beneath on the midrib and often on the veins: fls. smaller, the petals with reflexed margin and therefore appearing narrow. C. China. Intr. 1901. Zone (V) VI.—**D. globòsa** Duthie. Lvs. smaller: fls. smaller, creamy white in smaller dense corymbs; filaments abruptly contracted below apex, without teeth. C. China. Intr. 1901. Zone (V) VI.—Another related species is **D. stamínea** R. Br. Lvs. ovate, 3–6 cm. long, long-acuminate, usually rounded at base, unequally serrate, densely covered with stellate hairs beneath: fls. about 1.5 cm. across, in corymbs 2–4 cm. across; filaments with large teeth. B.R.33:13(c). Himal. Intr. 1841. Zone VIII.—Var. **Brunoniàna** Hook. f. & Thoms. Lvs. less pubescent: fls. larger. B.R.26:5(c). (*D. corymbosa* Lindl., not R. Br., *D. canescens* Hort.)

15. **D. Vilmorìnae** Lemoine. Shrub to 2 m.; bark of brts. pale brown, tardily exfoliating: lvs. oblong-lanceolate, 3–6, on shoots to 9 cm. long, acuminate, broad-cuneate or rounded at base, serrulate, scabrid above, grayish green beneath, densely covered with 9–12-rayed hairs, and usually with simple spreading hairs along the nerves; petioles 3–5 mm. long: fls. white, 2–2.5 cm. across, in loose slender corymbs 5–7 cm. across; pedicels 1–1.5 cm. long; calyx-teeth lanceolate, slightly longer than tube; stamens slightly shorter than the petals, the filaments toothed usually much below apex; styles 3–4, almost as long as stamens. Fl.vi. F.V.126. R.H.1895:266, 267. Gn.79: 564;81:224(h). M.O.221(h),222.—Handsome and graceful shrub with large white fls. in loose and large corymbs.

D. V. × *rosea grandiflora* = **D. excéllens** Rehd. Lvs. ovate-oblong, 3–6, on shoots to 9 cm. long, acuminate, rounded or broad-cuneate at base, serrulate, scabrid above, grayish white beneath with many-rayed hairs and often with simple spreading hairs along the midrib; petioles 3–4 mm. long: fls. 2 cm. across, in loose corymbs 4–6 cm. across; pedicels 5–15 mm. long; calyx-teeth lanceolate, about as long as tube; filaments with large spreading teeth some distance below the apex. (*D. discolor e.* Lemoine.) Orig. before 1911.—*D. V.* × *scabra* = *D. magnifica;* see No. 8.

Group 4. Grandiflorae Rehd. Infl. 1–3-fld.; ovary partly superior; calyx-teeth narrow-lanceolate; filaments with long recurved teeth.

16. **D. grandiflòra** Bge. Shrub to 2 m.; bark of brts. usually grayish brown: lvs. ovate, 2–5 cm. long, acute or acuminate, rounded at base, closely and irregularly denticulate, scabrid above, white-tomentose beneath and reticulate; petioles 2–3 mm. long: fls. white, 2.5–3 cm. across, 1–3 on short lateral brts. usually only with one pair of lvs.; calyx-lobes linear-lanceolate, about twice as long as tube; petals elliptic-oblong, 1.2–2 cm. long; filaments with large

spreading and recurved teeth; style 3, longer than the stamens. Fl.IV–V. Mém. Acad. Sci. St. Petersb.VII.10,No.16:t.3,f.1–13. N. China. Intr. 1910. Zone V.—The earliest of all species to bloom and the one with the largest fls.

Another species with solitary flowers is **D. coreàna** Lév. which represents a distinct section, COREANAE Rehd. characterized by solitary fls. originating from axillary leafless buds on the brts. of the previous year. Lvs. elliptic-oblong to lanceolate, 4–6 cm. long, with scattered, 4–6-rayed hairs on both sides. Korea. Intr. 1917. Zone V?

Sect. II. MESODEUTZIA Engl. Petals valvate in bud: filaments subulate or toothed.

17. **D. móllis** Duthie. Shrub to 2 m.; brts. with stellate pubescence while young, older red-brown: lvs. elliptic or ovate to ovate-oblong, 4–8, on shoots to 12 cm. long, acute or short-acuminate, broad-cuneate to subcordate at base, closely serrulate, with scattered 3–4-rayed hairs above, grayish green and soft-pubescent beneath, the hairs being formed by usually 4 horizontal rays and an upright central one; petioles 3–6 mm. long: fls. white, 1–1.2 cm. across, in rather dense corymbs 6–8 cm. across, with appressed and spreading hairs; calyx-teeth broad-ovate, shorter than tube; petals broad-obovate, rounded; filaments subulate; styles usually 3, shorter than the longer stamens. Fl.VI. B.S.1:484. C. China. Intr. 1901. Zone VI?—A very distinct but not very showy Deutzia, easily distinguished by the soft pubescence of its rather broad lvs.

18. × **D. Wilsònii** Duthie. (*D.* ? *discolor* × *mollis.*) Brts. with chestnut-brown exfoliating bark: lvs. elliptic to oblong-lanceolate, 6–9 cm., on shoots to 12 cm. long, acute or acuminate, broad-cuneate or rounded at base, irregularly serrulate, scabrid and rugose above, grayish green beneath, densely covered with 5–10-rayed stellate hairs mixed particularly on the veins with numerous simple spreading hairs; petioles 3–5 mm. long: fls. white, about 2 cm. across, in rather loose broad corymbs; calyx-teeth ovate to ovate-oblong, abruptly mucronulate, about as long as tube; petals broad-elliptic, partly valvate in bud; filaments gradually or abruptly narrowed below apex, rarely slightly dentate; styles 3–4, shorter than the longer stamens. Fl.VI. B.M. 8083(c). Gn.89:515(h). M.G.28:16(h). C. China. Intr. probably 1901. Zone VI.—Handsome shrub, similar to *D. discolor*, but easily distinguished by the broader lvs. hairy-pubescent below and the scarcely toothed filaments.

19. **D. corymbòsa** R. Br. Shrub to 3 m.; brts. glabrous or nearly so, with brown exfoliating bark: lvs. ovate to oblong-ovate, 4–8, on shoots to 10 cm. long, long-acuminate, broad-cuneate or rounded at base, serrulate with usually incurved teeth, bright green on both sides, with minute stellate hairs, those below 8–12-rayed; petioles 2–4 mm. long: fls. white, about 1.5 cm. across, in convex or pyramidal corymbs 4–8 cm. across; calyx-lobes triangular, shorter than tube, deciduous; petals orbicular-obovate; filaments all toothed; styles usually 4, about as long as stamens. Fl.VI. Mém. Acad. Sci. St. Pétersb. VII.10,No.16:t.3,f.14–17. S.H.1:f.244g-i. (*D. parviflora* var. *c.* Franch.) Himal. Intr. 1830. Zone VII?

20. **D. parviflòra** Bge. Shrub to 2 m.; young brts. with scattered stellate hairs; lvs. ovate or elliptic to ovate-lanceolate, 3–6, on shoots to 10 cm. long, acuminate, usually cuneate at base, unequally serrulate with usually spreading teeth, green on both sides and with scattered stellate hairs, those beneath 6–9-rayed; petioles 3–5 mm. long: fls. white, about 1.2 cm. across, in many-fld. corymbs 4–7 cm. across; calyx-lobes broad-ovate, shorter than tube; petals roundish-obovate; filaments without teeth or the shorter indistinctly

toothed; styles usually 3, shorter than the longer stamens. Fl.vi. Gt.11:t. 370;43:65(h);46:382. G.F.1:361. G.C.III.14:153(h). A.F.15:1297(h). N. China. Intr. 1862. Zone V or IV.—Var. **musaèi** Lemoine. More vigorous; lvs. larger, more acuminate: fls. creamy white in denser infl. N. China. Intr. 1883.—Var. **ovàtifolia** Rehd. Lvs. ovate, rounded at base. Intr. 1910.—Handsome free-flowering shrub, one of the hardiest species.

D. p. × *setchuenensis* = **D. myriántha** Lemoine. Lvs. oblong-ovate to oblong-lanceolate, 4–6, on shoots to 9 cm. long, long-acuminate, rounded or broad-cuneate at base, denticulate-serrulate, scabrid on both sides, the hairs beneath 5–6-rayed: fls. white, 2 cm. across in loose corymbs 5–8 cm. across; calyx-teeth triangular, short: filaments strongly toothed, the inner filaments often with the anther attached inside. G.C.III.52:45. A.F.31:100, 101. M.G.22:376(h),377. Orig. before 1904. Zone VI.

A related species is **D. compácta** Craib. Lvs. ovate-oblong, 3–6 cm. long, rounded at base: fls. creamy-white, slightly pinkish in bud, in dense corymbs 3–5 cm. across; stamens short, the outer filaments with large spreading teeth, the inner oblong with the anther attached inside. Fl.vi–vii. W. China. Intr. 1905. Zone VI?

21. × **D. Lemoìnei** Lemoine. (*D. parviflora* × *gracilis.*) Upright shrub to 2.5 m.; young brts. glabrous or nearly so, older with brown exfoliating bark; lvs. elliptic-lanceolate to lanceolate, 3–6, on shoots to 10 cm. long, long-acuminate, cuneate at base, sharply serrulate, green on both sides, with scattered 5–8-rayed hairs beneath; petioles 3–5 mm. long: fls. 1.5–2 cm. across, in panicles or pyramidal corymbs 3–8 cm. high; pedicels slender, glabrous; calyx-teeth triangular, much shorter than tube; petals obovate, partly valvate in bud; filaments toothed below the apex; styles 3, shorter than the longer stamens. Fl.vi. G.F.9:285. Gt.46:383. G.C.III.18:389(h). A.F.11: 437(h). Orig. in 1891. Zone V.—Var. **compácta** Lemoine. Dwarfer and more compact: fls. smaller in numerous panicles. Gn.M.27:22.—Here belongs also "Boule de neige" with larger fls. in dense corymbs. J.P.IV.3:309. Gng. 8:306.—A handsome and very free-flowering shrub, one of the hardiest Deutzias.

D. L. × *Sieboldiana* = **D. cándida** Rehd. Bark of brts. brown, scarcely exfoliating: lvs. ovate to ovate-oblong, 3.5–5 cm. long, acuminate, rounded at base, serrulate, slightly scabrid above, green beneath, with scattered 5–7-rayed hairs; petioles 1–2 mm. long: fls. 1.8 cm. across, slender-pedicelled, in rather loose panicle-like corymbs 3–4 cm. across; calyx-teeth oblong-ovate, green, almost as long as tube; petals elliptic, chiefly valvate: filaments with short teeth or abruptly contracted, the longer ones often gradually narrowed. M.G.22:376(h). (*D. discolor c.* Lemoine.) Orig. before 1907.

22. × **D. maliflòra** Rehd. (*D. Lemoinei* × *purpurascens.*) Lvs. ovate-oblong, 2.5–4 cm. long, acuminate, usually rounded at base, serrulate, green beneath, with scattered 5–8-rayed hairs; petioles 1.5–3 mm. long: fls. about 2 cm. across, purplish outside, in corymbs 3–6 cm. across; calyx-teeth oblong, acutish, purplish, longer than tube: filaments with large ascending teeth.—Here belongs "Fleur de pommier" (Gn.M.25:228), the typical form of this hybrid, and "Boule rose" which differs in its somewhat smaller lighter colored fls., shorter calyx-teeth and in the less strongly toothed filaments; also "Avalanche" which has large white fls., larger lvs. usually broad-cuneate at base, and is nearer to *D. Lemoinei.* Fl.vi. Orig. about 1903.

23. × **D. kalmiaeflòra** Lemoine. (*D. purpurascens* × *parviflora.*) Young brts. sparingly stellate-pubescent: lvs. ovate-oblong to ovate-lanceolate, 3–6 cm. long, acuminate, usually broad-cuneate at base, serrulate, light green beneath, with scattered 6–8-rayed hairs; petioles 2–3 mm. long: fls. white, carmine outside, cup-shaped, about 2 cm. across, in rather loose 5–12-fld. corymbs; pedicels stellate-pubescent; calyx-teeth ovate, about as long as

tube; petals obovate, partly valvate in bud; filaments with large ascending teeth, the inner often prolonged undivided above the anther. Fl.vi. M.G. 28:25. Gn.W.17:627. Gn.M.25:229. G.27:199. Orig. before 1904. Zone V. —A very handsome graceful shrub with rather large pinkish fls.

24. **D. hypoglaûca** Rehd. Shrub to 2 m.; young brts. glabrous, older with chestnut-brown exfoliating bark: lvs. ovate-oblong to oblong-lanceolate, 3–5, on shoots to 9 cm. long, acuminate, rounded or broad-cuneate at base, serrulate, sparingly stellate above, glabrous and glaucous beneath; petioles 1–2 mm. long; fls. pure white, 1.5–2 cm. across, in many-fld. convex corymbs 4–6 cm. across; pedicels glabrous; calyx-teeth broad-triangular, obtuse, shorter than tube; petals roundish-obovate; outer filaments with large ascending teeth, the inner ones produced undivided beyond the anther. Fl.vi. C. China. Intr. 1910. Zone V.—Upright shrub with pure white fls. in semi-globose corymbs; very handsome and distinct, easily distinguished from all cultivated species by the glaucous and quite glabrous under side of the lvs.

6. **WHÍPPLEA** Torr. Low deciduous shrub; buds small, with few outer scales: lvs. opposite, subsessile, 3-nerved, with few shallow teeth, estipulate: fls. small, in long-peduncled head-like compact cymes; sepals 5 or 6: petals 5 or 6; stamens 10–12, about as long as petals; ovary 3–5-celled, half-superior; cells 1-ovuled; styles 3–5, distinct; caps. subglobose, separating into 3–5 leathery, 1-seeded carpels. (After Lieut. A. W. Whipple, commander of the surveying expedition to the Pacific Ocean 1853–54.) One species.

W. modésta Torr. Shrub with trailing or arching branches 20–50 cm. long and upright strigillose brts.: lvs. ovate or elliptic 1–3.5 cm. long, acute or acutish, strigillose on both sides: fls. white, in dense cymes or racemes 1–2 cm. across; sepals ovate; petals rhombic, about 3 mm. long; caps. 2–2.5 cm. across. Fl.v. Rep. Exp. Surv. Pacif. Ocean, 4:t.7. S.H.1:f.241a-g. N. & M. Calif. Intr. before 1892. Zone VII?—A low prostrate shrub of no ornamental merit.—For *W. utahensis* S. Wats., a low upright shrub with similar small fls., see *Fendlerella utahensis*, p. 282.

7. **PLATYCRÀTER** Sieb. & Zucc. Deciduous shrub; buds with 2–3 pairs of acuminate outer scales: lvs. opposite, petioled, serrate, estipulate: fls. white, in terminal loose cymes; the marginal fls. sterile with enlarged 3–4-lobed calyx; sepals 4, acute, petals 4, ovate; stamens numerous, with filiform filaments; styles 2, distinct; ovary inferior, 2-celled: fr. a turbinate caps. dehiscent at apex; seeds numerous, linear, winged at both ends. (Greek *platys*, broad, and *crater*, bowl; alluding to the broad calyx of the sterile flowers.) One species.

P. argùta Sieb. & Zucc. Prostrate shrub; brts. glabrous or nearly so, later grayish brown with exfoliating bark: lvs. oblong to lanceolate, 10–18 cm. long, long-acuminate, cuneate at base, coarsely serrate, with scattered hairs above and pilose on the veins beneath or nearly glabrous: fls. about 2 cm. across, slender-pedicelled, in 5–10-fld. cymes; sepals lanceolate, about half as long as petals, the marginal fls. with obtusely 3–4-lobed calyx. Fl.vii. S.Z.1:t.27(c). H.F.1870:206(c). H.S.1:f.245a-l. Japan. The form in cult. is var. **horténsis** Maxim. with smaller usually 3–5-fld. cymes usually lacking the sterile fls. Gt.15:t.516. Intr. 1864. Zone VIII?—It is of little decorative value and likes a shady and humid position.

8. **HYDRÁNGEA** L. Deciduous upright, rarely climbing shrubs; brs. usually with ample white pith and exfoliating bark; buds with 2 or 3 pairs of

outer scales: lvs. opposite, petioled, usually serrate, rarely lobed, estipulate: fls. perfect, small, in terminal corymbs, rarely in panicles, often with sterile marginal fls.; calyx-lobes 4–5, short; petals 4–5, valvate, small; stamens 8–20, usually 10; ovary inferior or half-superior; styles 2–5, short: fr. a 2–5-celled caps. dehiscent at apex; seeds numerous, minute, winged or wingless. (Greek *hydor*, water, and *aggeion*, vessel; alluding to the shape of the caps.) About 35 species in N. and S. Amer., and in E. Asia south to Java.—Ornamental medium-sized shrubs with small white or sometimes blue or pink fls. in usually showy corymbs or panicles; the self-clinging *H. petiolaris* is valuable for covering walls and other objects. They prefer as a rule moist situations and rich soil.

A. Stems upright; stamens 10; petals free, expanding.
B. Infl. paniculate.
C. Lvs. lobed ..... 4. *H. quercifolia*
CC. Lvs. not lobed, serrate ..... 8. *H. paniculata*
BB. Infl. corymbose, flat or hemispherical.
C. Ovary partly superior, hence caps. ovoid, with the calyx-margin about or above the middle; styles usually 3–4.
D. Fertile fls. blue or pink.
E. Infl. sessile, with lvs. at the base: lvs. elliptic-lanceolate, pubescent on the veins beneath ..... 5. *H. Davidi*
EE. Infl. peduncled, leafless or rarely with 1 or 2 leafy bracts.
F. Lvs. obovate to broad-elliptic, glabrous or slightly puberulous beneath, fleshy ..... 6. *H. macrophylla*
FF. Lvs. ovate or elliptic to lanceolate, sparingly pubescent on both sides, rather thin ..... 7. *H. serrata*
DD. Fertile fls. white.
E. Lvs. villous or nearly glabrous beneath.
F. Brts. of last year with close brown or grayish brown bark. 9. *H. xanthoneura*
FF. Brts. of last year with exfoliating brown bark ..... 10. *H. Bretschneideri*
EE. Lvs. white-tomentose beneath ..... 11. *H. heteromalla*
CC. Ovary inferior, hence caps. truncate, with the calyx-limb at apex.
D. Corymb without involucre at base.
E. Brts. glabrous or puberulous when young: seeds wingless.
F. Lvs. glabrous below: corymbs without or very few marginal fls. 1. *H. arborescens*
FF. Lvs. pubescent beneath.
G. Lvs. densely grayish pubescent beneath: corymbs usually with marginal fls ..... 2. *H. cinerea*
GG. Lvs. white-tomentose beneath, longer, acuminate: corymbs always with marginal fls ..... 3. *H. radiata*
EE. Brts. densely pubescent: seeds winged.
F. Brts. densely covered with harsh spreading hairs: lvs. rounded at base. 14. *H. Sargentiana*
FF. Brts. strigose.
G. Lvs. cordate or rounded at base ..... 15. *H. longipes*
GG. Lvs. cuneate at base ..... 13. *H. strigosa*
DD. Corymbs enclosed before expanding by large bracts: upper pair of lvs. subsessile. 12. *H. involucrata*
AA. Stems climbing by aërial rootlets: lvs. broad-ovate, nearly glabrous: petals cohering at apex ..... 16. *H. petiolaris*

Sect. I. Euhydrangea Maxim. Upright shrubs; petals free and spreading: seeds winged at the ends or wingless.

Group 1. Americanae Maxim. Seeds wingless; capsule inferior, truncate at apex; fertile fls. white; petals spreading or reflexed, persistent during anthesis.

1. **H. arboréscens** L. Upright straggling shrub, usually 1, occasionally to 3 m.; young brts. sparingly puberulous: lvs. ovate to elliptic, acute or acuminate, rounded or cordate at base, 6–20 cm. long, serrate, glabrous or sometimes puberulous beneath: petioles 2–6 cm. long: corymbs 5–15 cm. broad, long-stalked; sterile fls. few, 1.5–2 cm. across: capsule 2.5–3 mm. diam. and slightly shorter, prominently 10-ribbed. Fl. VI–VII. B.M.437(c). B.B.2:231. G.W. 15:612(h). (*H. vulgaris* Michx., *H. urticifolia* Hort.) N. Y. to Iowa, s. to Fla. and La. Intr. 1736. Zone V.—Var. **cordata** Torr. & Gr. Lvs. broad-ovate, cordate at base. W.D.t.42(c). (*H. c.* Pursh.)—Var. **grandiflòra** Rehd. A form of var. *cordata* with all the fls. sterile forming subglobose heads

10–18 cm. across; sepals ovate, acutish. F.E.31:606. M.G.27:472. Gn.75: 435. Found wild in Ohio before 1900.—A striking plant with large heads of white flowers.—Var. **stérilis** Torr. & Gr. A form of the type with all the fls. sterile; sepals broad-oval, rounded or mucronate at apex. Found in Pa. before 1840, but apparently not now in cult.—Usually a round bush with conspicuous creamy-white fl.-clusters in early summer.

H. a. × *radiata* = **H. canéscens** Kirchn. Resembling the following species: petiole shorter; lvs. smaller; the pubescence beneath usually thinner, the hairs under the microscope nearly smooth (tuberculate in *H. cinerea);* sterile fls. wanting or few. (*H. arborescens* var. *c.* Nichols.) Orig. before 1860.

2. **H. cinérea** Small. Spreading shrub, sometimes 2 m. tall; young brts. puberulous: lvs. elliptic or broad-ovate to ovate-oblong, 6–15 cm. long, short-acuminate, rounded or subcordate at base, serrate, bright green above, grayish tomentose beneath; petioles 2–8 cm. long: corymbs 5–20 cm. across; sterile fls. usually present, few. Fl.vi–vii. B.B.2:231. (*H. arborescens* var. *Deamii* St. John.) N. C. and Tenn. to Ga. and Ala. Intr. 1906.—Var. **stérilis** Rehd. A form with all the fls. sterile forming a head 8–15 cm. across; sepals broad-ovate, obtuse. Gs.4:27(h). (*H. arborescens* var. *Deamii* f. *acarpa* St. John.) Orig. before 1908. Similar to the sterile form of the preceding species.

3. **H. radiàta** Walt. Upright shrub, sometimes to 2.5 m.; young brts. puberulous: lvs. ovate to ovate-lanceolate, rather long-acuminate, subcordate or rounded at base, 6–12 cm. long, serrate, dark green and glabrous above, white-tomentose beneath and reticulately veined; petioles 1.5–6 cm. long: corymbs 5–12 cm. broad, often with numerous ray-flowers 2–3 cm. broad. Fl.vi–vii. W.D.1:43(c). F.E.32:11(h). (*H. nivea* Michx.) N. and S. Car. Intr. 1786. Zone V.—Similar to the two preceding species, but the foliage handsomer on account of the contrasting white under side of the lvs.

4. **H. quercifòlia** Bartr. Shrub to 2 m. with upright and spreading brs.; young brts. reddish tomentose: lvs. ovate to suborbicular in outline, sinuately 3–7-lobed, usually truncate at base and decurrent into the petiole, 6–20 cm. long, lobes broad, serrate and often slightly lobed, whitish tomentose beneath: infl. paniculate, 10–30 cm. long with numerous white sterile fls. 2–3 cm. and finally 3–4 cm. across and turning purple, the sepals usually orbicular-obovate: caps. about 3 mm. high. Fl.vi. B.M.975(c). Add.5:t.175(c). G.C.II.22:369. Gn.M.32:260(h). Gs.2:305(h). Ga. and Fla. to Miss. Intr. 1803. Zone (V) VI.—Handsome shrub chiefly valued for the distinct shape and the size of its foliage; also the large panicles are striking.

Group 2. Petalanthae Maxim. Seeds wingless or with very short wing; caps. half or partly superior, ovoid: fertile fls. pink or blue; petals finally reflexed, usually persisting during anthesis: infl. corymbose.

5. **H. Davídii** Franch. Shrub to 2 m.; young brts. pubescent, older light brown: lvs. elliptic-lanceolate to oblong-lanceolate, long-acuminate, cuneate at base, 8–15 cm. long, dentate-serrate, yellowish green and nearly glabrous above, pubescent on the nerves beneath; petioles 1–2.5 cm. long: infl. a convex loose corymb 12–25 cm. across or sometimes paniculate, with 1 or 2 pairs of lvs. at base; fertile fls. bluish; petals lanceolate, styles 3–4; sterile fls. 2.5–4 cm. across, with orbicular-ovate entire sepals: caps. with the calyx-limb about the middle. Fl.vi–vii. W. China. Intr. 1908. Zone VII?—Handsome shrub with large loose corymbs of blue fertile fls. surrounded by white sterile fls.

6. **H. macrophýlla** DC. Shrub to 4 m.; brts. stout, glabrous: lvs. obovate to elliptic or broad-ovate, short-acuminate, broad-cuneate at base, 7–15 cm. long, coarsely serrate with triangular obtusish teeth, bright green and lustrous

above, light green beneath, glabrous or slightly puberulous beneath and light green, petioles stout, 1–3 cm. long, leaving large scars, the opposite ones contiguous; corymbs peduncled, sparingly appressed-pubescent, in the sterile form globose and 15–20 cm. or more across; in the fertile form flattened; fls. blue or pink, rarely white; petals ovate-oblong soon deciduous; styles 3–4; sterile ray-fls. large, with entire or dentate sepals; caps. ⅓ or ¼ superior, ovoid, with the short styles 6–8 mm. long. Fl.VI–VII. (*H. opuloides* K. Koch, *H. hortensis* Sm., *H. Hortensia* DC., *Hortensia opuloides* Lam.) Japan. Zone VII or VIII.—Var. **Hortênsia** Rehd. Fls. all sterile, with broad-ovate, entire sepals; pink to blue: lvs. usually elliptic. B.M.438(c). G.C. III.52:251;71:87(h). (*H. opuloides* var. *H.* Dipp.) This is the typical form and was intr. from China in 1790.—Var. **otâksa** Wils. Dwarfer, with smaller obovate lvs. and entire obovate sepals. S.Z.1:t.52(c). F.S.17:t.1732–3(c). R.H.1868:450,t(c). A.G. 44:415(h). F.E.9:52, 401(h). Intr. from Japan before 1861.—Var. **Veitchii** Wils. A form with deep rose-pink sterile fls. Gn.50:122, t(c). G.W.7:582,t(c). (*H. Hortensia* var. *japonica rosea* Bean.) Intr. from Japan 1880.—Var. **mandshùrica** Wils. Stems dark purple or nearly black: lvs. elliptic: fls. rose-colored, nearly all sterile. A.F.5:361. (*H. Hortensia* var. *nigra* Nichols. *H. m.* Koehne, *H. opuloides* var. *cyanoclada* Dipp.) Cult. 1870. Zone VI?—Var. **normàlis** Wils. The wild type with a flat corymb of perfect fls. and with a few pink sterile ray-fls. 3–5 cm. across. C. Japan. Intr. 1917.—Var. **rôsea** Wils. Similar to the preceding, but with toothed pink ray-fls. S.Z.1: t,53(c). (*H. japonica* Sieb., *H. japonica* var. *r.* Sieb. & Zucc.) Cult. 1841. —Var. **Marièsii** Wils. With rosy-pink ray-fls. 5–8 cm. across, entire or sparingly toothed. Gn.54:390,t(c);87:431. G.C.III.23:suppl. of May 28. (*H. Hortensia* var. *M.* Bean.) Intr. 1879 from Japan.—Var. **macrosépala** Wils. With white, toothed ray-fls. Gt.15:t.520(c).—Var. **coerùlea** Wils. Perfect fls. deep blue and the ray-fls. blue or white. S.Z.1:t.55(c). B.M.4253(c). (*H. Belzoni* Sieb. & Zucc., *H. japonica* var. *c.* Hook.) Cult. 1846. Zone VI. —One of the hardier forms.—Var. **maculàta** Wils. Lvs. edged white: infl. with fertile and sterile fls. F.S.7:t.696(c). (*H. hortensis variegata* Nichols.) Cult. 1850.

7. **H. serràta** DC. Shrub to 1.5, rarely to 2.5 m., with rather slender brs. glabrous or pubescent at first: lvs. elliptic or ovate to lanceolate, 5–10 cm. long, acuminate, cuneate at base, finely or coarsely serrate, sparsely appressed-pubescent on both sides, midrib with short curled hairs, sometimes only above; petiole 1–2.5, rarely to 5 cm. long: fls. blue or white, in flat or slightly convex corymbs 4–8 cm. across, with few rather small, white, pink or bluish ray-fls.: caps. ovoid, 2–4 mm. long, with 3 short diverging styles. Fl.VII–VIII. S.Z.1: t.58(c). G.C.1870:1699. (*H. Thunbergii* Sieb., *H. opuloides* var. *s.* Rehd.) Japan, Korea. Cult. 1870. Zone VI or V?—Var. **acuminàta** Wils. Lvs. 9–18 cm. long, caudate-acuminate; ray-fls. usually blue. S.Z.1:t.56,57(c). R.H. 1874:91,t(c). S.L.225(h). M.G.32:41(h). (*H. a.* Sieb. & Zucc., *H. opuloides* var. *a.* Dieck.) Intr. about 1870.—Var. **pubéscens** Wils. Lvs. ovate or elliptic-ovate, caudate-acuminate, with appressed and spreading hairs on the veins beneath: ray-fls. pink or white. (*H. hortensis* var. *p.* Franch. & Sav., *H. opuloides* var. *sinensis* Dipp.) Cult. 1888.—Var. **rosâlba** Wils. Lvs. ovate to obovate, usually rounded at base, slightly pubescent beneath: ray-fls. white and pink, usually toothed. F.S.16:t.1649–50(c). R.H.1866:432,t(c). Gn. 46:466,t(c). (*H. japonica r.* Vanhoutte, *H. hortensis* var. *Lindleyana* Nichols, *H. opuloides* var. *r.* Rehd.) Cult. 1864.—Var. stellàta Wils. Lvs. ovate or elliptic-ovate, pubescent on both sides: ray-fls. with numerous elliptic-ovate

to oblong pointed sepals. S.Z.1:t.59(c). (*H. s.* Sieb. & Zucc., *H. opuloides* var. *s.* Dipp.) Cult. 1864.

To the Petalanthae also belongs **H. scándens** Ser. Slender shrub: lvs. elliptic to elliptic-lanceolate, 3–6 cm. long, serrate, sparingly strigose above: corymbs few-fld., umbelliform, usually with lvs. at base; sterile fls. with 3 or 4 large white or pinkish sepals; caps. with the calyx-limb slightly below the middle. S.Z.1:t.60(c). (*H. virens* Sieb. & Zucc.) Japan. Cult. 1904. Zone VII?

Group 3. Heteromallae Rehd. Seeds winged at the ends: fertile fls. white; petals cadoucous; styles usually 3: caps. half-superior.

8. **H. paniculàta** Sieb. Shrub or small tree to 10 m.; brts. stout, pubescent: lvs. elliptic or ovate, acuminate, rounded or cuneate at base, 5–12 cm. long, serrate, sparingly pubescent or nearly glabrous above, setose-pubescent beneath, particularly on the veins: fls. in large panicles 15–25 cm. long, styles 2–3; sterile fls. with 4 entire, elliptic sepals, white changing later to purplish: caps. with the calyx-limb about the middle. Fl.viii–ix. S.Z.1,t.61(c). Gt. 16,t.530(c). Gn.75:548(h);76:5(h). G.C.III.78:447,t(h).—Japan, China. Intr. before 1864. Zone IV.—Var. **praècox** Rehd. Sepals of the sterile fls. narrow-elliptic: flowering about 6 weeks earlier than the type. G.F.10:363. B.C.3:1621. Intr. 1892.—Var. **grandiflòra** Sieb. Nearly all fls. sterile; panicle to 30 cm. long. F.S.16:t.1665–6(c). R.H.1873:50,t(c). Gn.72:560(h). Gg.3:357(h);5:3(h). C.L.7:43(h). Intr. 1862.—The hardiest and one of the most showy of the Hydrangeas particularly in its sterile form.

9. **H. xanthoneùra** Diels. Shrub to 5 m.; brts. stout, pubescent, the 2d year with chestnut-brown close bark marked with conspicuous lenticels: lvs. elliptic to elliptic-oblong, abruptly acuminate, cuneate at base, 10–18 cm. long, serrate, bright green and nearly glabrous above and usually with yellowish veins, beneath slightly pubescent on the veins or nearly glabrous; petioles 1–3 cm. long, glabrous: corymbs rather loose, convex, 12–15 cm. across; sterile fls. 3–5 cm. broad, with oval obtuse sepals: capsule with the calyx-limb about the middle. Fl.vii. W. China. Intr. 1904. Zone V.—Var. **Wilsònii** Rehd. Bark of 2-year-old brts. grayish or pale brown; lvs. usually oblong, lustrous above. M.G.1912:26(h). Intr. 1909—Var. **setchuenénsis** Rehd. Two-year-old brts. light brown: lvs. to 20 cm. long, villous below. W. China. (*H. Bretschneideri* var. *s.* Rehd.) Intr. 1908.—Handsome large shrub, similar to the following, but with larger lvs. and more vigorous.

10. **H. Bretschneìderi** Dipp. Shrub to 3 m.; brts. pubescent, two-year-old brts. with chestnut-brown bark peeling off in thin flakes: lvs. ovate or elliptic-ovate to oblong-ovate, acute or acuminate, cuneate at base, 7–12 cm. long, serrate, glabrous above, villous beneath; petioles 1–3 cm. long, not margined: corymbs 10–15 cm. across, slightly convex; sepals of sterile fls. broad-oval, obtuse, changing to purplish. Fl.vii. G.F.3:17;6:396(h). Gg.16:305(h). B.S.1:624,t(h). (*H. vestita* var. *pubescens* Maxim., *H. pekinensis* Hort.) N. China. Intr. 1882. Zone V.—Var. **glabréscens** Rehd. Lvs. smaller, usually elliptic and more coarsely serrate, sparingly pubescent beneath. (*H. serrata* Koehne, not DC.)—Handsome shrub with spreading brs. forming a broad round bush very attractive when in bloom.

A closely related species is **H. hypoglaùca** Rehd. Lvs. glaucous beneath and silky-strigose on the veins. C. China. Intr. about 1901. Zone VI?

11. **H. heteromálla** Don. Shrub to 3 m.; young brts. densely pubescent, 2-year-old brts. with olive-brown close lenticellate bark: lvs. elliptic-ovate, acuminate, cuneate at base, 10–20 cm. long, densely setose-denticulate, nearly glabrous above, whitish tomentose beneath; petioles 2–6 cm. long, margined and deeply grooved, usually red: corymbs 12–20 cm. broad, pubes-

cent, with bracts; sepals of sterile fls. elliptic or obovate: caps. with the calyx-limb above the middle. Fl.VI–VII. F.S.4:t.378–9(c). G.M.50:859. Himal. Intr. 1821. Zone VII?—Handsome shrub with large lvs., their dark green upper side contrasting pleasingly with the red petioles and the whitish under side.

Group 4. PIPTOPETALAE Maxim. (*Asperae* Rehd.) Seeds winged at the ends: ovary inferior, capsule truncate at apex; styles usually 2: fls. white, blue or pink.

12. **H. involucràta** Sieb. Shrub to 1.5 or 2 m.; young brts. densely strigose: lvs. elliptic-oblong or oblong, acuminate, cuneate at base, 10–20 cm. long, densely and sharply serrate, appressed-pubescent on both sides, denser beneath and more scabrid: corymbs enclosed before expanding by large suborbicular bracts; fertile fls. usually pinkish; sterile fls. whitish, 1.5–3 cm. across. Fl.VII–VIII. S.Z.1:t.63(c). J.H.III.32:103. Japan. Cult. 1864. Zone VIII. —Var. **horténsis** Maxim. The fertile fls. double, often proliferous. S.Z.1:t. 64(c). F.S.3:t.187(c). Cult. 1846.

13. **H. strigòsa** Rehd. Shrub to 2.5 m.; brts. densely strigose: lvs. oblong-ovate to elliptic-lanceolate or lanceolate, acuminate, cuneate or rounded at base, 7–18 cm. long, serrulate or serrate, sparingly strigose or nearly glabrous above, grayish beneath and densely strigose, particularly on the veins and veinlets; petioles 1–2.5 cm. long, strigose: corymbs 10–15 cm. across; sterile fls. white or purplish, 2–3.5 cm. across, with broad-ovate, entire or serrate sepals. Fl.VIII. (*H. aspera* Hemsl., not Don.) C. China. Intr. 1907. Zone VII or VIII?—Var. **macrophýlla** Rehd. Lvs. 20–30 cm. long; cymes to 20 cm. across, with the sterile fls. about 5 cm. broad.—Upright shrub with handsome large corymbs.

Closely related species are: **H. áspera** Don which differs chiefly in the fimbriate-denticulate lvs. grayish-white beneath and densely scabrid-villous: styles usually 3. Himal., W. China. Intr. ? Zone VIII?—**H. villòsa** Rehd. Stems, petioles and cymes densely clothed with spreading villous hairs often ferrugineous: lvs. fimbriate-denticulate, strigose above, grayish white and densely villous beneath. W. China. Intr. 1908. Zone VII?—Var. **strigòsior** Rehd. has the petioles and brts. with few or sometimes without spreading hairs. Intr. 1905 or before.—Possibly this species and the preceding *H. strigòsa* are only vars. of *H. aspera*.

14. **H. Sargentiàna** Rehd. Upright shrub to 2 m., with stout brs.; brts. densely clothed with bristles and harsh hairs; young growth purplish: lvs. ovate to ovate-oblong, short-acuminate, rounded or subcordate at base, 15–25 cm. long, crenate-serrate, dull green and hairy above, densely rough-villous beneath; petioles 3–8 cm. long: corymbs nearly flat, dense, 12–16 cm. across; fertile fls. pale violet; sterile fls. white; styles 2–3. Fl.VII–VIII. B.M. 8447(c). Gn.77:264(h). B.S.1:630.—C. China. Intr. 1907. Zone VIII?—A striking plant with its large lvs., the dense purplish pubescence on the young growth and the large violet cymes with white marginal fls. Prefers half-shady position.

15. **H. lóngipes** Franch. Spreading shrub to 2, or occasionally 3 m., with rather slender lax brs.; brts. sparingly strigose: lvs. broad-ovate to ovate, rarely oblong-ovate, acuminate, rounded to cordate at base, 8–16 cm. long, sharply and unequally serrate or dentate, sparingly strigose above, strigose beneath on the veins and veinlets, sometimes glabrescent, rather thin; petioles 5–15 cm. long: corymbs 10–15 cm. across, pedicels densely strigose; sterile fls. about 3 cm. across, with orbicular-obovate, usually entire sepals. Fl.VI–

VII. C. and W. China. Intr. 1901. Zone VI or VII.—Loosely branched shrub, remarkable for its long petioles.

A closely related species is **H. Rosthórnii** Diels. Larger and stouter shrub: lvs. 10–20 cm. long, unequally and densely fimbriate-dentate, grayish and densely strigose and reticulate beneath; petioles stouter, 3–10 cm. long: corymbs larger; sepals of sterile fls. toothed or entire. W. China. Intr. 1908. Zone VII?—Very similar to the preceding species is **H. robústa** Hook. f. & Thoms. Lvs. coarsely serrate, with brown hairs on the nerves beneath: fertile fls. blue; styles 2–3. B.M. 5038(c). (*H. cyanema* Nutt.) Himal. Cult. 1858. Zone VIII?

Sect. II. CALYPTRANTHE Maxim. Shrubs climbing by aërial rootlets: petals cohering at apex and falling off as a whole: caps. truncate; seeds winged all around, compressed.

16. **H. petiolàris** Sieb. & Zucc. Climbing to 25 m.; older brs. with flaky brown bark: lvs. broad-ovate to ovate or oval, acute or acuminate, cordate or rounded at base, 5–10 cm. long, serrate, nearly glabrous, dark green and lustrous above; petioles 2–8 cm. long: corymbs rather loose, 15–25 cm. across; stamens 15–20; styles usually 2; sterile fls. about 3 cm. across, with entire sepals. Fl.VI–VII. B.M.6788(c). S.Z.1:t.54(c),59, 92(c). M.G.12:236, 237 (h);34:57(h). Gn.88:144(h). B.S.1:628&t(h). (*H. scandens* Maxim., not DC., *H. volubilis* Hort.) Japan, China. Intr. 1875.—A handsome climbing shrub clinging firmly to walls and tree trunks, conspicuous in early summer with its large white flower-clusters.

A closely related species is **H. anómala** Don. Lvs. ovate to elliptic-ovate or ovate-oblong, broad-cuneate at base, denticulate-serrate: corymbs smaller; stamens 10; sterile fls. wanting or few, about 2.5 cm. across. Wallich, Tent. Fl. Nepal t.50. (*H. altissima* Wall.) W. China, Himal. Intr. 1839 from Himal.,1908 from W. China. Zone VII?

9. **SCHIZOPHRÁGMA** Sieb. & Zucc. Deciduous shrubs climbing by aërial rootlets; bark of 2-year-old brts. close, splitting longitudinally on older brs.; buds with 2–4 pairs of chestnut-brown pubescent or ciliolate outer scales: lvs. opposite, long-petioled, dentate or entire, estipulate: fls. white, in loose terminal stalked corymbs with sterile marginal flowers consisting of a single large sepal; fertile fls. small, with 4–5 sepals and as many petals; stamens 10; style 1, short, with capitate 4–5-lobed stigma; fr. a 10-ribbed turbinate caps. opening between the ribs; seeds numerous, linear. (Greek *schizein*, to cleave, and *phragma*, wall; referring to the opening of the caps.) Three species in E. Asia.—Climbing shrubs very similar in habit and general appearance to *Hydrangea petiolaris*, but easily distinguished by the solitary sepal of the sterile fls. and in winter by the close longitudinally splitting bark and the pubescent or ciliolate winter-buds.

A. Lvs. coarsely dentate ..... 1. *S. hydrangeoides*
AA. Lvs. entire or sparingly denticulate ..... 2. *S. integrifolium*

1. **S. hydrangeoìdes** Sieb. & Zucc. Climbing to 10 m. or more: lvs. suborbicular or broad-ovate, short-acuminate, rounded or cordate at base, 5–10 cm. long, remotely coarsely dentate, nearly glabrous; petioles 3–7 cm. long, reddish: corymbs about 20 cm. broad; sepal of the marginal fls. oval to broadly ovate, 3–3.5 cm. long. Fl.VII. S.Z.1:t.26, 100(c). B.M.8520(c). Gn. 34:281. R.H.1881:313,f.72. Japan. Cult. 1880. Zone V.

2. **S. integrifòlium** Oliv. Climbing to 4 m. or more: lvs. ovate or broad-ovate, acuminate, truncate or subcordate at base, 10–15 cm. long, entire or sparingly denticulate, usually pubescent on the veins beneath, of thickish texture: petioles 3–8 cm. long: corymbs to 25 cm. broad; sepals of sterile fls. ovate to ovate-oblong, 3.5–6 cm. long. Fl.VII. B.M.8991(c). H.I.20:1934. J.L.28:f.21. M.O.215(h),217. (*S. hydrangeoides* var. *i.* Franch.) C. and W.

China. Intr. 1901. Zone VII.—Var. **molle** Rehd. Petioles and lvs. beneath densely villous; sterile sepals 5–7 cm. long. W. China. Intr. 1908.—This species differs from the preceding in the larger sterile fls. and in the larger and darker lvs., but it is tenderer.

10. **DECUMÀRIA** L. Deciduous or half-evergreen shrubs climbing by aërial rootlets; bark of brs. exfoliating; buds small, pubescent, with indistinct scales: lvs. opposite, estipulate, petioled, entire or sparingly toothed: fls. perfect, white, small, in terminal corymbs; calyx-tube turbinate; sepals 7–10, minute; petals as many, valvate, oblong to narrow-oblong; stamens 20–30, with subulate filaments; ovary inferior, 5–10-celled; styles united, with capitate, 7–10-lobed stigma; caps. urceolate, ribbed, opening between the ribs; seeds numerous, minute, linear-clavate. (Latin *decumus* = *decimus*, ten; referring to the number of parts in the flower.) One species in N. Am. and one in China.

D. bárbara L. Climbing to 10 m.: lvs. ovate to elliptic, acute or abruptly short-acuminate, rarely obtuse, 5–10 cm. long and 2.5–5 cm. broad, glabrous and lustrous above, glabrous beneath or slightly pubescent on the nerves: corymbs round-topped, 5–10 cm. across: caps. urn-shaped, surrounded above the middle by the calyx-limb. Fl. v–vi. B.B.2:233. G.C.III.46:242,suppl. S.L.182(h). (*D. sarmentosa* Bosc.) Va. to Fla. and La. Intr. 1785. Zone (V) VI.—A handsome climber clinging firmly to walls and tree-trunks, preferring moist and half-shady positions.

A closely related species is **D. sinénsis** Oliv. Less high climbing: lvs. generally oblong and obtuse, 3–7 cm. long and 1–2.5 cm. broad; pedicels appressed-pubescent. H.I.18:1741. C. China. Intr. 1908. Zone VII?

11. **ÍTEA** L. Deciduous or evergreen shrubs or trees; brs. with lamellate pith; buds small, superposed, with 3–4 outer scales: lvs. alternate, serrulate to dentate, estipulate: fls. perfect, white, small, in terminal or axillary racemes or panicles; calyx-tube turbinate; sepals 5, persistent; petals as many, narrow, valvate; stamens 5, inserted under the edge of the disk; anthers oblong; ovary superior, 2-celled; styles united; ovules numerous; caps. elongated, 2-grooved, elongated, 2-valved; seeds flattened. (Greek name of the willow.) About 10 species in S. E. Asia and 1 in N. Am.

I. virginiàna L. Upright shrub to 1 or sometimes to 3 m., with slender, virgate brs. pubescent while young: lvs. elliptic or obovate to oblong, acute or short-acuminate, usually cuneate at base, 4–10 cm. long, serrulate, glabrous above, often sparingly pubescent beneath; petioles 5–10 mm. long: fls. white, fragrant, in upright, dense pubescent racemes 5–15 cm. long; petals 4 mm. long; stamens as long as petals: caps. 6–8 mm. long, narrow, pubescent. Fl. vi–vii. B.M.2409(c). B.C.3:1707. S.L.234(h). N. J. and Pa. to Fla. and La. Intr. 1744. Zone V or VI.—Usually a low shrub with virgate brs.; the rather narrow medium sized lvs. turn brilliant red in autumn.

Probably not hardy within our area is **I. ilicifòlia** Oliv. Evergreen shrub to 3 m.: lvs. elliptic, obtuse, 6–11 cm. long, spiny-toothed: fls. greenish white, in dense drooping racemes 15–35 cm. long. H.I.16:1538. G.C.III.34:375; 43:123;64:151(h). C. China. Intr. 1901. Zone VIII?

12. **ESCALLÒNIA** Mutis. Evergreen, rarely deciduous trees or shrubs, usually glandular: lvs. alternate, usually serrate, estipulate: fls. white, pink or red, in terminal racemes or panicles or axillary; calyx-tube turbinate to cylindric; sepals 5, short; petals usually narrow and with long claws; stamens 5, inserted under the margin of the disk; style 1, with capitate, 2- or 4–5-lobed

stigma; ovary inferior, 2–3-celled; ovules numerous: fr. a caps. 2–3-valved, with small oblong often curved seeds. (After Escallon, a Spanish traveler.) Fifty or 60 species in S. Am., chiefly in the Andes.

E. virgàta Pers. Deciduous, much-branched shrub to 1 m.; brts. brown, glabrous: lvs. obovate to oblanceolate or lanceolate, acute, cuneate at base, 8–15 mm. long, finely serrate, usually entire below the middle: fls. white, about 1 cm. across, axillary, often forming short leafy racemes at the end of the brts.; calyx-lobes triangular, entire or serrulate; petals roundish-obovate scarcely clawed; stamens shorter than petals; style scarcely as long as sepals: caps. subglobose. Fl.VI–VII. G.C.II.10:108. J.L.37:52,t. Gn.83:518(h);86:408(h), 453. S.L.198(h). (*E. Philippiana* Mast., *E. virgata* var. *Philippiana* Engl.) Chile. Intr. between 1860 and 1866. Zone VI?—A low shrub with spreading densely leafy brs., in leaf and flower similar to *Leptospermum scoparium;* the hardiest of all Escallonias.

E. v. × *macrantha* or *E. punctata* = **E. langleyénsis** Veitch. Evergreen shrub to 3 m., with arching brs.; brts. glandular: lvs. obovate to narrow-elliptic, 1–2.5 cm. long, serrate, glabrous, resinous beneath: fls. rosy-carmine, 1.2 cm. across. G.C.III.22:15;24:11(h). Gn.74:351(h);79:315. B.S.1:528. B.C.2:1144. Orig. 1893. Zone VII?

The following two evergreen species from Chile may also prove hardy within our area: **E. illinìta** Presl. Glabrous and resinous shrub to 10 m., with obovate or oval lvs. 2–6 cm. long and white fls. in terminal panicles to 10 cm. long. B.R.t. 1900(c). Intr. 1831.—**E. pterócladon** Hook. Shrub to 2.5 m., with angled pubescent brts., with oblong dark green lvs. 1–2.5 cm. long and white fls. in slender racemes 3–7 cm. long. B.M.4827(c). Intr. 1847.

13. RÌBES L. Deciduous or rarely evergreen, unarmed or prickly shrubs; buds with several scarious or herbaceous scales: lvs. alternate, petioled, simple, usually palmately lobed, folded or rarely convolute in bud, estipulate: fls. perfect or dioecious, 5-merous, rarely 4-merous, in few or many-flowered racemes, rarely clustered or solitary; calyx-tube cylindric to rotate, like the sepals usually colored; petals usually smaller than the sepals, often minute, rarely wanting; stamens shorter or longer than the sepals; ovary inferior, 1-celled, many-ovuled; styles 2, more or less connate: fr. a juicy berry, usually many-seeded; seeds albuminous, with minute terete embryo. (Probably derived from *ribas*, the Arabian name for Rheum Ribes.) About 150 species in the colder and temp. regions of the n. hemisphere, in Am. in the Andes s. to Patagonia.—At least half of the species have been introduced to cult. Some are valued for their edible frs., particularly *R. sativum* and *R. Grossularia*, others are ornamental shrubs and planted for their handsome fls., or for their attractive frs. or lvs., while many are without particular merits and are found only in botanical collections. They are almost all early leafing shrubs flowering with or soon after the unfolding of the lvs. and ripening their fruit mostly in mid-summer, rarely later.

A. Brs. unarmed or rarely with a pair of small prickles below the petiole: fls. usually in racemes; pedicels jointed.
  B. Fls. dioecious; racemes usually upright.
    C. Lvs. deciduous: fls. greenish to purple.
      D. Fls. in several- to many-fld. racemes.
        E. Brts. quite unarmed: lvs. generally suborbicular to ovate.
          F. Young growth viscid-glandular ..... 2. *R. orientale*
          FF. Young growth glabrous or nearly so.
            G. Fls. greenish: lvs. with short obtuse lobes ..... 1. *R. alpinum*
            GG. Fls. red-brown or purple: lvs. acute or acuminate.
              H. Fls. rotate ..... 3. *R. tenue*
              HH. Fls. saucer-shaped ..... 4. *R. glaciale*
        EE. Brts. with slender paired prickles below the petiole: lvs. generally obovate, cuneate at base ..... 5. *R. diacantha*
      DD. Fls. solitary or in 2–9-fld. fascicles.
        E. Ovary glabrous ..... 7. *R. fasciculatum*

EE. Ovary glandular-bristly.....9. *R. ambiguum*
CC. Lvs. persistent.
D. Lvs. suborbicular, 3–5-lobed: fls. yellow.....8. *R. Gayanum*
DD. Lvs. ovate-oblong, crenate-serrate: fls. greenish.....6. *R. laurifolium*
BB. Fls. perfect, in usually pendulous or nodding racemes: lvs. deciduous.
C. Color of fls. yellow; calyx-tube tubular: lvs. convolute in bud: glands crystalline.
D. Calyx-tube less than twice as long as sepals; sepals spreading, connivent after flowering: young brts. glabrous or puberulous.....10. *R. aureum*
DD. Calyx-tube at least twice as long as sepals, 2–2.5 mm. thick; sepals revolute or spreading, not connivent: young brts. and petioles pubescent, rarely glabrous. 11. *R. odoratum*
CC. Color of fls. white, pink, red or greenish: lvs. plicate in bud.
D. Calyx-tube tubular to campanulate.
E. Ovary glandular: lvs. resin-dotted or viscid-glandular beneath.
F. Lvs. beneath and other parts of plant with viscid glands.
G. Lvs. white-tomentose beneath: fls. usually red, in many-fld. racemes. 13. *R. sanguineum*
GG. Lvs. not or slightly pubescent beneath.
H. Lvs. 4–9 cm. broad.
I. Calyx-tube cup-shaped: fls. greenish white in long-peduncled racemes. 12. *R. Wolfii*
II. Calyx-tube cylindric or cylindric-campanulate.
J. Sepals longer than tube; fls. red, rarely white, in many-fld. racemes. 14. *R. glutinosum*
JJ. Sepals shorter than tube; fls. greenish or pinkish, in few- or several-fld. racemes.....15. *R. viscosissimum*
HH. Lvs. 1–3.5 cm. broad; calyx-tube tubular; racemes few-fld.: fr. red.
I. Bracts of racemes cuneate-obovate, toothed; fls. white, rarely pinkish. 16. *R. cereum*
II. Bracts of racemes rhombic, usually acutish, entire or with a few teeth; fls. pink.....17. *R. inebrians*
FF. Lvs. resin-dotted beneath: fls. whitish or greenish.
G. Calyx-tube tubular-campanulate; racemes many-fld....20. *R. americanum*
GG. Calyx-tube broad-campanulate; racemes few-fld.....21. *R. nigrum*
EE. Ovary and fr. glabrous: lvs. not glandular or only with a few stalked glands beneath.
F. Racemes dense; sepals ciliate; fls. purple, pink or reddish, broad-campanulate. 27. *R. petraeum*
FF. Racemes loose; sepals glabrous; fls. pale, narrow-campanulate.
G. Fls. sessile; racemes to 12 cm. long.....28. *R. moupinense*
GG. Fls. stalked; racemes to 30 cm. long, very loose....29. *R. longeracemosum*
DD. Calyx-tube rotate or saucer-shaped.
E. Ovary and fr. glandular; racemes upright or ascending.
F. Lvs. resin-dotted beneath: upright shrubs: fr. black.
G. Bracts of racemes large, broadest in the middle; racemes 10–20 cm. long: fr. bloomy.....18. *R. bracteosum*
GG. Bracts of racemes narrow, narrowed from the base; racemes 3–6 cm. long: fr. without bloom.....19. *R. hudsonicum*
FF. Lvs. not resin-dotted beneath, fetid: fr. red: prostrate shrub.. 22. *R. glandulosum*
EE. Ovary and fr. glabrous; racemes drooping or nodding.
F. Stamens shorter than sepals, sepals spreading.
G. Habit upright.
H. Calyx-tube saucer-shaped, with plane disk; anther-cells contiguous: lvs. usually truncate.....23. *R. rubrum*
HH. Calyx-tube rotate, inside with a 5-angled elevated ring; anther-cells separated by a broad connective: lvs. cordate or subcordate. 24. *R. sativum*
GG. Habit procumbent: anther-cells contiguous.....25. *R. triste*
FF. Stamens as long as sepals; sepals recurved; racemes very dense and long. 26. *R. multiflorum*
AA. Brts. more or less prickly, rarely nearly unarmed: fls. 1–4 and pedicels not jointed (except in No. 30).
B. Fls. in racemes; sepals broader than long; stems bristly.....30. *R. lacustre*
BB. Fls. 1–4; sepals longer than broad.
C. Color of flowers white or greenish and often suffused with purple.
D. Sepals white or sometimes greenish-white.
E. Stamens as long as sepals or longer.
F. Filaments villous: brts. brown.
G. Ovary glabrous; calyx-tube about as long as broad.....31. *R. niveum*
GG. Ovary glandular or pubescent; calyx-tube twice as long as broad. 32. *R. curvatum*
FF. Filaments glabrous; stamens nearly twice as long as the greenish white sepals: brts. yellowish or gray.....33. *R. missouriense*
EE. Stamens shorter than sepals; young brts. usually very bristly, grayish.
F. Peduncle elongated; calyx-tube cylindric-campanulate.....34. *R. setosum*
FF. Peduncle scarcely exceeding the bud-scales; calyx-tube campanulate. 35. *R. oxyacanthoides*

DD. Sepals green or greenish, often tinged purplish.
E. Style and calyx-tube inside pubescent.
F. Fr. not prickly; stamens about as long as sepals (half as long in No. 40).
G. Lvs. cuneate or rounded at base.
H. Sepals about as long as tube; stamens as long or scarcely longer than sepals. . . . . 36. *R. hirtellum*
HH. Sepals about twice as long as tube; stamens slightly longer than sepals. 37. *R. rotundifolium*
GG. Lvs. subcordate or occasionally rounded at base; sepals recurved during anthesis.
H. Ovary glabrous.
I. Sepals longer than tube; stamens slightly longer than sepals. 38. *R. divaricatum*
II. Sepals shorter than tube; stamens slightly shorter than sepals. 39. *R. inerme*
HH. Ovary pubescent or glandular; stamens about half as long as sepals. 40. *R. Grossularia*
FF. Fr. prickly, not glandular, rarely smooth; stamens less than half as long as sepals. . . . . 41. *R. cynosbati*
EE. Style and calyx-tube inside glabrous.
F. Fr. prickly: petals obtuse: brts. very bristly. . . . . 42. *R. bureiense*
FF. Fr. not prickly, glandular-bristly or smooth.
G. Petals elliptic, acute, connivent; fls. greenish or reddish. . . . 43. *R. alpestre*
GG. Petals obovate, obtuse, upright; fls. white or pink. . . . . 44. *R. leptanthum*
CC. Color of fls. orange, purple or bright red; style glabrous.
D. Fls. 5-merous.
E. Anthers oval; calyx-tube cylindric-campanulate.
F. Fls. orange; sepals longer than stamens: fr. prickly. . . . . 45. *R. pinetorum*
FF. Fls. red or purple; sepals about as long as stamens: fr. densely glandular. 46. *R. Lobbii*
EE. Anthers sagittate, lanceolate to lance-ovate.
F. Calyx-tube cylindric; fls. not glandular: fr. prickly. . . . . 47. *R. Roezlii*
FF. Calyx-tube campanulate: fr. glandular-bristly. . . . . 48. *R. Menziesii*
DD. Fls. 4-merous, bright red; stamens 2–4 times as long as sepals. . . . 49. *R. speciosum*

Subgen. I. BERISIA Spach. Fls. dioecious, usually in racemes; pedicels jointed: unarmed shrubs, rarely with small paired nodal prickles.

Sect. 1. EUBERISIA Jancz. Racemes upright; staminate fls. without ovary, pistillate without pollen; petals minute; stamens much shorter than sepals: buds with scarious scales: brs. always unarmed.

1. **R. alpìnum** L. ALPINE CURRANT. Shrub to 2.5 m., nearly glabrous; buds acute: lvs. roundish or ovate, truncate or subcordate, 3–5 cm. across, 3-, rarely 5-lobed, with obtuse or acute dentate lobes: fls. greenish yellow, in upright racemes, the staminate 3–6 cm. long, with 20–30 fls.; the pistillate smaller; calyx-tube rotate; sepals ovate: fr. subglobose, scarlet, glabrous. R.I.23:t.135(c). L.B.15:1486(c). S.E.4:t.419(c). (*R. opulifolium* Hort.) Eu. Cult. 1588. Zone II.—Var. **aûreum** Pynaert. Dwarf form with yellowish lvs. R.B.4:233,t(c). Cult. 1878.—Var. **laciniàtum** Kirchn. Lvs. more deeply and incisely toothed. Cult. 1864.—Var. **pùmilum** Lindl. A dwarf form with smaller lvs. (Var. *humile* A. Br.) Cult. 1830.—The pistillate form is sometimes distinguished as var. *bacciferum* Wallr. and the staminate as var. *sterile* Wallr.—An early leafing much branched shrub of dense habit with upright stems and spreading brs., usually broader than high, the pistillate form with attractive scarlet berries in summer and autumn. Well adapted for planting in shady places and as undergrowth.

A closely related species is **R. tricúspe** Nakai. Lvs. cordate, with acute or acuminate lobes: staminate racemes 1–2 cm. long with 8–12 often brownish fls.; sepals elliptic; pistillate with 2–6 fls.: fr. ellipsoid, small. Korea, Manch., Jap. Intr. before 1907. Zone V.—Another related species is **R. Vilmorìnii** Jancz. Shrub to 2 m.; buds obtusish: lvs. 2–3 cm. across, 3–5-lobed: staminate racemes 5–20 mm. long; fls. greenish or brownish: fr. black, glabrous or glandular. Jancz., Monog. Gros.462. W. China. Intr. 1902. Zone V.

2. **R. orientàle** Desf. Upright shrub to 2 m.; young growth with stalked viscid glands: lvs. roundish or reniform, truncate or cordate, about 4.5 cm. long and 5.5 cm. broad, 3–5-lobed with short rounded dentate lobes, bright green and lustrous above, pubescent on the veins beneath; petioles about 2

cm. long: racemes pubescent and glandular, the staminate 2–5 cm. long; fls. rotate, green, usually suffused with red; sepals ovate: fr. scarlet, pubescent and glandular. B.M.1583(c). (*R. resinosum* Pursh.) E. Eu. and W. Asia to Siber. and Himal. Intr. 1805. Zone V.—Var. **heterótrichum** Jancz. Young shoots reddish: lvs. lustrous: fls. reddish: fr. not glandular. Ledeb., Icon. Fl. Ross.t.235. Siber. Cult. 1907.—Shrub similar to *R. alpinum*, but easily distinguished by the viscid-glandular pubescence.

3. **R. ténue** Jancz. Shrub similar to *R. alpinum;* glabrous; buds ovoid, obtusish: lvs. ovate, truncate, to 3.5 cm. long and to 3 cm. broad, 3–5-lobed, lobes acute, incisely toothed, the middle one longer; staminate racemes 3–5 cm. long, pistillate smaller: fls. rotate, brownish-red; sepals elliptic-ligulate: fr. red, globose. Jancz., Monog. Gros.464. Himal., W. China. Intr. about 1900. Zone V.—Flowering and leafing very early.

4. **R. glaciàle** Wall. Shrub to 5 m.; nearly glabrous; young brts. red or reddish; buds oblong, obtusish: lvs. roundish or ovate, cordate or truncate, to 6 cm. long, 3–5-lobed, the middle lobe longer, acute or short-acuminate, sparingly glandular-bristly; petioles 1–2 cm. long: staminate racemes 1.5-4.5 cm. long, 7–30-fld.; pistillate with 3–6 smaller fls.; fls. saucer-shaped or subturbinate, brownish purple; sepals ovate: fr. globose or obovoid, scarlet, glabrous. Jancz., Monog. Gros. 468, suppl.5:737. Himal., C. and W. China. Intr. from Nepal in 1823, from W. China about 1900. Zone V.—Var. **angustisépalum** Jancz. Sepals ovate-lanceolate. C. China. Intr. 1907.—Similar in habit to *R. alpinum* chiefly distinguished by the longer acute middle lobe of the lvs. and the brownish cup-shaped fls.

R. g. × *luridum* = **R. Wallíchii** Jancz: Lvs. similar to *R. luridum*, fls. to *R. glaciale*. Jancz., Monog. Gros. suppl.4:619(fl). Orig. 1907.

A closely related species is **R. lùridum** Hook. f. & Thoms. Lvs. roundish, about 5 cm. long and 6 cm. broad with short and broad sometimes obtusish lobes; petiole about 4 cm. long: staminate racemes 3–5 cm. long: fls. dark purple, turbinate: fr. black, glabrous. Leafing late; fr.x. Jancz., Monog. Gros.469, 470. Himal., W. China. Intr. about 1900. Zone V.

To this sect. also belongs **R. Maximowíczii** Batal. differing from the preceding species by the glandular-bristly fr.: lvs. usually ovate, 4–9 cm. long, slightly 3–5-lobed or nearly simple, coarsely dentate, pubescent on both sides: racemes pubescent, 3–5 cm. long; fls. red: fr. red, yellow or greenish. Jancz., Monog. Gros. 473(fl). W. China. Intr. ?—Var. **floribúndum** Jesson. Racemes 10–15 cm. long: fr. with thinner and fewer bristles. B.M.8840(c). (*R. Jessonianum* Stapf.) W. China. Intr. 1903. Zone VI?

Sect. 2. Diacantha Jancz. Buds and fls. as in sect. 1: brts. with 2 small prickles at the nodes and often with smaller scattered prickles.

5. **R. diacántha** Pall. Upright shrub to 2 m., glabrous: brts. with paired prickles at the nodes, often with scattered additional prickles, rarely nearly unarmed; buds small: lvs. ovate to obovate, cuneate or sometimes rounded, 2–3.5 cm. long, slightly 3-lobed, the lobes obtusish, sparingly dentate, lustrous with obsolete veins: staminate racemes 2–3 cm. long, pistillate 1–2 cm. long; rachis glabrous, glandular; fls. greenish yellow, rotate; sepals ovate: fr. globose or globose-ovoid, scarlet, glabrous, small. S.O.2:t.97(c). S.L.1:f.258s-u, 261f-i. (*R. saxatile* Pall.) N. Asia, Tian-shan to Manch. Intr. 1781. Zone I.—Shrub with lustrous bright green lvs., similar to *R. alpinum*, but of more upright habit.

A closely related species is **R. pulchellum** Turcz. Lvs. to 5 cm. long, more deeply 3-lobed, truncate or subcordate: staminate racemes to 6 cm. long; fls. saucer-shaped, reddish: fr. red, glabrous. Jancz., Monog. Gros.453. N. China. Cult. 1905. Zone V.—Another related species is **R. Giráldii** Jancz. Brts. pubescent while young, bristly, with larger nodal spines: lvs. truncate or subcordate, about 3.5 cm. broad, 3–5-lobed, pubescent and glandular: fls. cup-shaped, greenish

brown: fr. glandular-bristly, red. N. China. Jancz., Monog. Gros.455. Cult. 1905. Zone V.

Sect. 3. DAVIDIA Jancz. Fls. as in sect. 1: lvs. evergreen.

6. **R. laurifòlium** Jancz. Evergreen shrub to 1.5 m., glabrous, glandular at first: lvs. ovate to ovate-oblong, acute, rounded at base, 5–10 cm. long, crenate-dentate, coriaceous; petioles bristly, 5–15 mm. long: staminate racemes nodding, 3–6 cm. long; petistillate shorter, upright, 6–12-fld.; fls. greenish yellow, rotate; sepals oval; ovary tomentulose: fr. ellipsoid, puberulous, purplish black, 1.5 cm. long, in pendulous racemes. B.M.8543(c). G.C.III. 55:239;71:213(h). Gn.76:143;79:170, 171. W. China. Intr. 1908. Zone VIII?

A related species is **R. Hénryi** Franch. Brts. glandular-bristly: lvs. elliptic, to 10 cm. long, crenate; glandular beneath: fls. greenish, the staminate in racemes 2–4 cm. long: fr. obovoid-oblong, green, to 2 cm. long, stipitate-glandular. Jancz., Monog. Gros. suppl.5:738. C. China. Intr. 1908. Zone VIII?

Sect. 4. HEMIBOTRYA Jancz. Fls. in 2–9-fld. umbels; staminate fls. with ovary containing sterile ovules; pistillate fls. with sterile pollen: buds with herbaceous scales: brs. always unarmed.

7. **R. fasciculàtum** Sieb. & Zucc. Shrub to 1.5 m. with upright or spreading brs.: lvs. roundish, truncate or cordate at base, 4–7 cm. wide, broader than long, 3–5-lobed with obtuse lobes, glabrous or slightly pubescent: fls. yellowish, cup-shaped, fragrant; staminate in 4–9-fld. umbels, pistillate only 2, sometimes 3–4: fr. subglobose, scarlet, crowned by the persistent calyx-tube, glabrous, insipid. Fl.IV–V; fr.IX–X. S.T.1:t.38. D.L.3:302. (*R. japonicum* Carr., *R. alpinum japonicum* Nichols.) Japan, Korea. Cult. 1884. Zone V.—Var. **chinénse** Maxim. Taller and more vigorous: lvs. larger, to 10 cm. across, pubescent beneath like the petioles and young brts., chartaceous, persistent into the winter. S.T.1:t.38,f.3,7–9. M.G.14:571. (*R. Billiardii* Carr.) N. China. Cult. 1867. Zone V.—Handsome shrub chiefly valued for the late persisting foliage and the scarlet fruits remaining on the brs. the whole winter.

The related **R. sardòum** Martelli with smaller glandular lvs. from Sardinia (cult. 1907) is probably not hardy within our area.

Sect. 5. PARILLA Jancz. Fls. in racemes, otherwise like those of the preceding section: lvs. often persistent. S. Amer. species.

8. **R. Gayànum** Walp. Evergreen shrub to 1.5 m.: young brts. and petioles villous: lvs. roundish, truncate to subcordate at base, 3–6 cm. long and slightly broader, with 3 or 5 short rounded toothed lobes; pubescent on both sides; petioles 1.5–2.5 cm. long, pubescent and glandular: fls. campanulate, pubescent, yellow, fragrant, in dense cylindric, erect racemes 3–6 cm. long borne on a stalk 2–4 cm. long: fr. globose, purple-black, hairy. B.M.7611(c). S.L.f.421(h). (*R. villosum* C. Gay, not Nutt.) Chile. Cult. 1858. Zone VIII?—This is one of the hardiest of the S. Amer. species and is chiefly grown for its fragrant fls.

The following S. Amer. species and hybrids are in cult.: × **R. austràle** Jancz. (*R. Gayanum* × *polyanthes.*) Jancz., Monog. Gros. suppl.4:614(fl).—× **R. chrysánthum** Jancz. (*R. integrifolium* × *polyanthes.*) Jancz., l. c. suppl.4:616(fl).—**R. integrifòlium** Phil. Gt.30:t.1047b-d., Jancz., l.c.448.—× **R. lùteum** Jancz. (*R. integrifolium* × *valdivianum.*) Jancz., l. c. suppl.4:617(fl).—**R. magellànicum** Poir. Jancz., l. c. 443; suppl.5:733.—× **R. Philíppii** Jancz. (*R. integrifolium* × *punctatum.*) Jancz., l. c. suppl.1:74.—**R. polyánthes** Phil. Jancz., l. c. 422.—**R. punctâtum** Ruiz & Pav. Jancz., l. c. 450, Ruiz & Pav., Fl. Peruv.3:t.233a.—**R. Ruízii** Rehd. (*R. glandulosum* Ruiz & Pav., not Grauer.) Jancz., l.c.431, Ruiz & Pav., Fl. Peruv.3:t.233b.—**R. valdiviânum** Phil. Jancz., l.c.445.

Subgen. II. RIBESIA Berl. Fls. perfect, usually in racemes; pedicels jointed: unarmed shrubs; bud-scales herbaceous, but scarious in sect. 12.

Sect. 6. MICROSPERMA Jancz. Fls. 1 or 2, greenish; receptacle saucer-shaped; pedicels with 2 bractlets; ovary glandular-bristly; style undivided: seeds very small, more than 50.

9. **R. ambíguum** Maxim. Low shrub, often epiphytic: lvs. roundish, cordate, 2–5 cm. wide, 3–5-lobed, with short, often obtuse, dentate lobes, pubescent or nearly glabrous above, viscid-glandular beneath: fls. 1 or 2, greenish, on pedicels about 1 cm. long; sepals elliptic; filaments flattened, broad: fr. green, subglobose, about 1.2 cm. across, glandular-hispid. Jancz., Mon. Gros.304. C. Japan, W. China. Intr. 1915. Zone V.—Interesting low shrub, without ornamental merit.

Sect. 7. Symphocalyx Berl. (§ *Siphocalyx* Endl., *Chrysobotrya* Spach.) Fls. in racemes, yellow; receptacle tubular; ovary glabrous: fr. smooth, black or yellow: lvs. convolute in bud (plicate in all other sections): glands crystalline.

10. **R. aûreum** Pursh. Golden Currant. Shrub to 2 m.; young brts. glabrous or puberulous: lvs. orbicular-reniform to obovate, cuneate to subcordate, 3–5 cm. wide, 3-lobed, the coarsely crenate-dentate lobes often with only 2 or 3 teeth, glabrous or sometimes puberulous beneath; petioles about as long as blade: fls. yellow, fragrant or slightly so, in 5–15-fld. racemes; bracts oblong to obovate; receptacle slender, 6–10 mm. long, 1.5 mm. thick, sepals more than half as long as the tube, spreading, upright and closed in the faded fl.; petals changing to red: fr. globose, black or purplish brown, 6–8 mm. across. B.R.1274(c). Card, Bush Fr.f.109. Jancz., Mon. Gros. suppl.3: f.89. (*R. tenuiflorum* Lindl., *R. a.* var. *tenuiflorum* Torr., *Chrysobotrya aurea* Rydb.) Wash. to Assinib., Mont., N. Mex. and Calif. Intr. in ?1806. Zone I.—Var. **chrysocóccum** Rydb. Fr. orange-yellow.—An ornamental very attractive shrub with golden yellow fragrant fls. appearing in spring with the lvs.

11. **R. odoràtum** Wendl. Buffalo Currant. Shrub to 2 m.; young brts. pubescent: lvs. ovate to orbicular-reniform, cuneate or truncate, 3–8 cm. wide, deeply 3–5-lobed, with coarsely dentate lobes, glabrate or puberulous beneath: fls. yellow, fragrant, in 5–10-fld., usually nodding racemes; bracts ovate to oval, foliaceous; rachis pubescent; receptacle 12–15 mm. long and 2–2.5 mm. broad; sepals scarcely half as long as tube, revolute or recurved, not upright and closed in the faded fl.; petals reddish; fr. globose to ellipsoid, 8–10 mm. long, black. B.R.2:125(c). L.D.5:301(c). L.B.1533(c). Card, Bush Fr.f.108. B.C.5:2958. (*R. fragrans* Lodd., *R. longiflorum* Nutt., *R. palmatum* Thory, *Chrysobotrya revoluta* Spach, *C. odorata* Rydb.) East of Rocky Mts., S. D. to w. Tex., east to Minn. and Ark. Intr. 1812. Zone V. Var. **xanthocárpum** Rehd. Fr. orange-yellow.—Var. **intermèdium** Rehd. Racemes spreading; receptacle about 12 mm. long; sepals about 8 mm. long, spreading: fr. orange-brown. Jancz., Monog. Gros.suppl.3:87. (*R. aureum* var. *i.* Jancz., *Chrysobotrya intermedia* Spach.)—Var. **leiób**otrys Rehd. Young brts. and rachis glabrous, glandular; sepals recurved, not revolute: fr. black. (*R. l.* Koehne, *R. aureum l.* Zabel.)—Conspicuous in spring with its golden yellow fragrant fls.; one of the handsomest of the ornamental currants. With larger fls. and of more spreading habit than the preceding species and more frequently planted, often as *R. aureum*. Large-fruited forms as the "Crandall" are sometimes grown for their fruit.

R. o. × *sanguineum* = *R. Gordonianum;* See under No. 13.

Sect. 8. Calobotrya Spach. Fls. in racemes, red, white or yellow, proterogynous; receptacle saucer-shaped to tubular: plant viscid-glandular: fr. often glandular, usually black and bloomy.

12. **R. Wólfii** Rothr. Shrub to 3.5 m.; young brts. finely puberulous or glabrous: lvs. suborbicular, cordate, 4–9 cm. wide, 3–5-lobed with obtuse or acutish serrate-dentate lobes, pubescent on the veins beneath and glandular: racemes erect, dense, 2–3.5 cm. long, on a slender pubescent and glandular

peduncle: ovary glandular, bristly; receptacle cup-shaped, puberulous; sepals ovate-oblong, 3–4 times the length of the receptacle, greenish white, spreading; petals white, much shorter than sepals; stamens half as long as sepals: fr. black, glandular-bristly, about 1 cm. across. B.M.8121(c). (*R. mogollonicum* Greene.) Colo. to N. Mex., Ariz. and Utah. Intr. 1900. Zone V.—An upright shrub of little ornamental merit.

13. **R. sanguíneum** Pursh. Shrub to 4 m.; young brts. pubescent and often sparingly glandular: lvs. reniform-orbicular, cordate to truncate, 5–10 cm. wide, 3–5-lobed, with obtuse irregularly dentate lobes, the middle one about as long as broad, dark green and puberulous above, whitish tomentose beneath; petioles pubescent and glandular: racemes ascending or pendulous, many-fld., pubescent and glandular; pedicels 8–10 mm. long; fls. red; sepals oblong, 5–7 mm. long, somewhat longer than the tubular receptacle; petals white or reddish, about half as long as sepals: fr. bluish black, bloomy, slightly glandular. Fl.v; fr.viii. B.M.3335(c). B.R.1349(c). B. C. to n. Calif. Intr. 1826. Zone (V) VII.—Var. **Brocklebánkii** Bean. With yellow lvs.—Var. **spléndens** Barbier. Fls. dark blood-red. R.H.1913:428,t(c). G.35:363. Orig. before 1900.—Var. **atrórubens** Loud. Fls. dark blood-red, but smaller and in smaller racemes than in the preceding form. (Var. *atrosanguineum* Kirchn.) Orig. before 1838.—Var. **cárneum** Dipp. Fls. pink. (*R. c. grandiflorum* Carr.)—Var. **albéscens** Rehd Fls. whitish. (*R. s. albidum* hort., not Kirchn.) Gn.58:208,t,f.2(c, as *R. album*). G.M.53:125. Often confused with *R. glutinosum albidum* Jancz. which is easily distinguished by the glabrous under side of the leaves. There are also double-fld. forms.—A very ornamental free-flowering shrub; very attractive with its numerous racemes of red fls.; the young growth exhales an aromatic odor.

R. s. × *odoratum* = **R. Gordoniánum** Lem. Habit of *R. odoratum*: lvs. usualyl truncate, 3-lobed, glabrate: racemes about 20-fld., fls. yellow, tinged red outside, somewhat glandular, sterile. F.S.2:t.165(c). (*R. Beatonii* Hort., *R. Loudonii* Hort.) Orig. about 1837. Zone VI?—*R. s.* × *malvaceum* = **R. Bethmóntii** Jancz. Differs chiefly in the style being considerably longer and the sterile anthers shorter than the petals. Jancz., Mon. Gros.490(fl). Orig. before 1904.—*R. s.* × *Grossularia* = **R. fontenayénse** Jancz. Unarmed: lvs. subchartaceous, subcordate, pubescent beneath; racemes horizontal, 3–6-fld.; fls. pubescent, vinous-red; receptacle cup-shaped; ovary pubescent-glandular: fr. rarely developed, purple-black, somewhat bloomy, glandular. Jancz., Mon. Gros.492. (*R. sanguineum Fontenaysii* Hort.) Orig. before 1877. Zone V?

Closely related species are: **R. malvâceum** Sm., which differs chiefly in the lvs. being bristly and rough above, in the usually rose-colored slenderer fls., with obtuse sepals shorter than the cylindric receptacle, in the densely white-pubescent ovary and the villous style, and in the viscid-pubescent fr. S.B.2:t.340. S.H.1: f.265m-n,266g-h. (*R. sanguineum* var. *m.* Loud.) Calif. Intr. about 1832. Zone VII?—**R. nevadénse** Kellogg. Lvs. thin, sparingly pubescent or nearly glabrous and green beneath: racemes usually spreading; fls. rose-colored, smaller; pedicels 3–5 mm. long; sepals ovate to oblong, about 4 mm. long; receptacle campanulate, about 2 mm. long: fr. blue, glaucous, glandular. Jancz., Mon. Gros.316, 317. Proc. Calif. Acad.III.Bot.2:t.23,f.4–5,t.24,f.6–7. (*R. sanguineum* var. *variegatum*. S. Wats., *R. variegatum* A. Nels.) Ore. to Calif. and Nev. Cult. 1907. Zone VI? or VII.

14. **R. glutinósum** Benth. Shrub to 4 m.: young brts., petioles and racemes pubescent and glandular-viscid: lvs. reniform-orbicular, cordate to truncate, 4–8 cm. broad, 3–5-lobed, with obtuse crenate-dentate lobes, at maturity glabrous above, green beneath, glandular, puberulous or nearly glabrous, rarely somewhat tomentose: racemes spreading or nodding; pedicels 8–10 mm. long; bracts reflexed; fls. red; sepals somewhat longer than the cylindric receptacle; style glabrous; ovary bristly-glandular, otherwise glabrous: fr. oblong, black, bloomy. Maund, Bot. Gard.t.597(c). Jancz., Mon. Gros.318.

S.H.1:f.265o,267a. (*R. sanguineum* var. *g.* Loud.) Calif. Intr. 1832. Zone VII?—Var. **albidum** Jancz. Fls. white, tinged pink. (*R. a.* Paxt., *R. sanguineum a.* Kirchn.) P.M.10:t.55(c). Orig. before 1840.—Handsome shrub, but tenderer than *R. sanguineum.*

R. g. albidum × *nigrum* = **R. Carrièrei** Schneid. Intermediate between the parents without the odor of *R. nigrum*: fls. pink, glandular, in 10–15-fld. spreading racemes to 8 cm. long; receptacle campanulate: fr. black, not bloomy. Jancz., Mon. Gros.489(fl). (*R. intermedium* Carr., not Tausch.) Orig. before 1867.

15. **R. viscosíssimum** Pursh. Shrub to 1 m.; young brts., petioles and infl. pubescent and viscid-glandular: lvs. reniform-orbicular, cordate, 5–8 cm. wide, usually 5-lobed, with short, rounded, crenate-dentate lobes, glandular-pubescent on both sides; petiole shorter than blade: fls. greenish white or pinkish, fragrant, in 3–8-fld. spreading or ascending racemes; receptacle cylindric-campanulate, 6–7 mm. long, about as long as sepals; ovary glandular: fr. black without bloom, glandular-bristly. Hooker, Fl. Bor. Am.t.76. Card, Bush Fr.f.103. S.H.1:f.265q,267b. B. C. and Mont. to Calif. and Colo. Intr. 1827. Zone V.—The hardiest species of this section, but less handsome.

Sect. 9. Cerophyllum Spach. Fls. small, white or pink, glandular, proterogynous, in 2–7-fld. racemes; receptacle cylindric, angled; ovary glandular or smooth: phyllotaxy of leaves ⅔ (⅖ in all other sections): plant glandular-viscid.

16. **R. cèreum** Dougl. Much-branched upright shrub to 1 m.; young growth glandular-pubescent: lvs. reniform, orbicular, cordate to broad-cuneate, 1–4 cm. wide, 3–5-lobed with obtuse crenulate lobes, glabrous or nearly so above, glandular-pubescent beneath; petioles almost as long as blade: fls. white or greenish, in few-fld. pendulous racemes; bracts cuneate-obovate, toothed at the truncate or rounded apex, glandular-pubescent and longer than the very short pedicels; receptacle cylindric, 6–8 mm. long; sepals ovate, about 2 mm. long, recurved; ovary glandular or smooth; style usually villous: fr. bright red, 6–7 mm. across. B.M.3008(c). Add.8:t.260(c). B.R.1263(c). B.C.5:2958. B. C. to Calif., east to Mont., Idaho and n. Ariz. Intr. 1827. Zone V.—Var. **farinòsum** Jancz. Brts. violet: lvs. whitish puberulent: fls. pink.—Early leafing shrub with small light grayish green lvs. and attractive with its white or pink fls. and later with its bright red frs.

17. **R. inébrians** Lindl. In habit and foliage scarcely different from the preceding species: fls. usually pink; bracts rhombic, usually acutish, entire or slightly toothed; ovary stipitate-glandular; style usually glabrous: fr. usually glandular, bright red. B.R.1471(c). B.B.2:238. (*R. Spaethianum* Koehne.) S. D. and Mont. to Calif. and N. Mex. Intr. 1827. Zone V.—Very similar to the preceding species.

A closely related species is **R. mescalèrium** Cov. Lvs. usually pubescent on both sides: fls. greenish white; bracts obovate, dentate at the obtuse apex; sepals oblong-ovate, about half as long as the receptacle; style glabrous: fr. sparingly glandular-pubescent, black. N. Mex. to w. Tex. Intr. 1916. Zone V?

Sect. 10. Eucoreosma Jancz. Racemes upright or pendulous: fls. proterandrous, greenish or brown, red or white; bracts usually linear; receptacle tubular or campanulate; ovary usually glandular: fr. black or brown: plant resinous-glandular.

18. **R. bracteòsum** Dougl. Californian Black Currant. Shrub to 3 m., with upright or ascending stems; young growth sparingly pubescent and glandular: lvs. thin, ovate, cordate, 5–20 cm. wide, deeply 5–7-lobed, with ovate to ovate-lanceolate, acute and sharply serrate lobes, resinous-glandular beneath; petioles about as long as blade or longer: fls. greenish or purplish in upright slender racemes to 20 cm. long; bracts spatulate, half as long as pedicels, the lower foliaceous; receptacle cup-shaped; sepals ovate-oblong,

3–4 mm. long: fr. globose, black with whitish bloom, resinous-glandular, edible. B.M.7419(c). Jancz., Mon. Gros.339. Alaska to n. Calif. Cult. 1895. Zone VI?—Remarkable for its large maple-like lvs. and the slender and very long upright racemes.

R. b. × *nigrum* = **R. fuscéscens** Jancz. which differs chiefly in the reddish-brown fls., in the smaller linear bracts of the shorter spreading or arching raceme and in the larger fr. Gt.55:162. Jancz. Mon. Gros. suppl.1:72. (*R. bracteosum* var. *f.* Jancz.) Orig. before 1905. Zone V.

A closely related species is **R. japónicum** Maxim. Brts. pubescent: lvs. 5-lobed, to 17 cm. wide, glandular and pubescent beneath; racemes pubescent; fls. pubescent and glandular: fr. black, not glandular. Jancz., Mon. Gros.340(fl). Japan. Intr. 1914? Zone V.

19. **R. hudsoniànum** Rich. Upright shrub: lvs. broader than long, cordate to subcordate, 3–10 cm. wide, 3–5-lobed, with ovate acute or obtusish, coarsely dentate lobes, pubescent and resinous-glandular beneath; petioles shorter than blade: fls. white, pubescent, in erect, loosely-fld. racemes 3–6 cm. long; pedicels short; bracts setaceous; sepals oval, spreading, longer than the cup-shaped receptacle: ovary resinous-glandular: fr. globose, black, 5–10 mm. thick. B.B.2:237. Hudson Bay to Alaska, s. to Minn. Cult. 1899. Zone I.

R. h. × *nigrum* = **R. Saundersii** Jancz. with pink fls. fading to whitish. Jancz., Mon. Gros.488(fl). Orig. 1904.

A closely related species is **R. petiolàre** Dougl. Lvs. glabrous or slightly pubescent, with sharply serrate lobes; petioles often longer than blade: racemes 5–10 cm. long. B. C. to Mont., s. to Ore. and Utah. Intr. 1827. Zone V.—Two related Asiatic species rare in cult. are the following: **R. dikúscha** Fisch. Upright shrub: lvs. 3–5-lobed, to 16 cm. broad, glabrous and glandular beneath; petioles shorter than blade; racemes loose, to 8 cm. long; fls. white, pubescent; bracts 1–1.5 mm. long; receptacle saucer-shaped: fr. bluish black, slightly bloomy. Jancz., Mon. Gros.344(fl). E. Siber. Intr. before 1911. Zone IV or III?—**R. procúmbens** Pall. Procumbent shrub: lvs. subcoriaceous, reniform, to 8 cm. wide, 3–5-lobed, with short obtuse lobes, glabrous and glandular beneath: racemes upright, 1–4.5 cm. long; fls. glabrous, glandular, reddish or purplish; bracts wanting or minute: fr. brownish, glabrous. Jancz., Mon. Gros.342. E. Siber. Cult. 1907. Zone IV or III?

20. **R. americànum** Mill. American Black Currant. Upright shrub to 1.5 m., with rather slender spreading brs.; young brts. slightly pubescent and glandular: lvs. suborbicular, cordate to nearly truncate, 3–8 cm. wide, 3–5-lobed, with acute or sometimes obtuse dentate lobes, resinous-dotted beneath and pubescent at least on the veins; petioles pubescent, shorter than blade: racemes pendulous, many-fld., glabrous or pubescent; fls. yellowish white; bracts longer than pedicels; ovary glabrous; sepals obtuse, recurved, slightly longer than the cylindric-campanulate receptacle; petals and stamens ⅔ the length of the sepals: fr. black, smooth. S.O.2:t.92(c). G.O.t.1(c). B.B.2:238. (*R. floridum* L'Hérit., *R. missouriense* Hort.) N. S. to Va., w. to Manit. and Colo. Intr. 1729. Zone I.—The pendulous racemes of whitish fls. are rather conspicuous though not showy and the lvs. turn yellow and crimson in autumn.

21. **R. nígrum** L. European Black Currant. Shrub to 2 m. with rather stout brs.; young brts. glandular and puberulous or nearly glabrous: lvs. suborbicular, cordate, 5–10 cm. wide, 3–5-lobed, with broad-ovate, irregularly serrate acutish lobes, sparingly pubescent and resinous-dotted beneath; petioles pubescent: racemes pendulous, 4–10-fld., fls. dull white; bracts usually shorter than pedicels; ovary and receptacle pubescent and glandular; sepals oblong, recurved, longer than the broad-campanulate receptacle; petals almost half as long as sepals: fr. black, subglobose. S.E.4:t.523(c). R.I.23:t.137(c). Card, Bush Fr. f. 100. Eu. to C. Asia and Himal. Occasionally escaped in the Middle St. Cult. 1588. Zone V.—Var. **reticulàtum**

Nichols. Lvs. densely mottled with yellow.—Var. **heterophýllum** Pepin. Lvs. deeply divided, sometimes to the base, with irregularly and deeply incised lobes. (*R. n. laciniatum* Ktze., *R. n. aconitifolium* Kirchn.) Orig. before 1846.—Var. **apiifòlium** Kirchn. Lvs. deeply divided usually to the base, the segments deeply and partly bipinnately lobed. (Var. *dissectum* Nichols.) Orig. before 1864.—Var. **xanthocárpum** Spaeth. Fr. yellow or whitish. Orig. before 1827.—Var. **chlorocárpum** Spaeth. Fr. green. Gt.16:t.562,f.16(c). Orig. before 1838.—Cult. for its fr. which is used for jams, the varieties sometimes planted for ornament. All parts of the plant exhale a peculiar heavy odor when bruised.

R. n. × *Grossularia* = **R. Culverwellii** Macfarl. Fls. similar to those of *R. nigrum*; the glandless lvs. and infl. resembling those of the gooseberry: fr. dark red, hairy. G.C.III.12:271;44:120. J.L.28:169–73. (*R. Schneideri* Maurer.). Orig. about 1880.—*R. n.* × *glutinosum* = *R. Carrierei;* see under No. 14.—*R. n.* × *bracteosum* = *R. fuscescens;* see under No. 18.—*R. n.* × *hudsonianum* = *R. Saundersii;* see under No. 19.

A closely related species is **R. ussuriénse** Jancz. Shrub with suckers: lvs. glabrous, resinous-dotted beneath, with the fragrance of camphor; petioles nearly glabrous: racemes 5–9-fld.; fls. pale; sepals spreading; receptacle campanulate; bracts at least half as long as pedicels: fr. black. Jancz., Mon. Gros.349. Manch. Cult. 1904. Zone V?

Sect. 11. Heritiera Jancz. Racemes upright; pedicels usually slender; fls. whitish or reddish, rotate or saucer-shaped, proterandrous; anthers recurved after anthesis; ovary glandular-bristly: fr. black or red: low or procumbent shrubs with crystalline glands.

22. **R. glandulòsum** Grauer. Fetid Currant. Low shrub with prostrate or spreading and reclining stems and ascending brts.; young growth sparingly pubescent and sparingly glandular: lvs. thin, fetid, orbicular, cordate, 3–8 cm. wide, 5–7-lobed, with ovate, acute or acutish doubly serrate lobes, pubescent on the veins beneath; petioles about as long as blade: racemes ascending, 8–12-fld., glandular; pedicels much longer than the narrow bracts; fls. white or pinkish; ovary glandular-hispid; receptacle cup-shaped; sepals short, spreading, glabrous outside; petals much longer than broad: fr. red, glandular-bristly. S.O.2:t.95(c). B.B.2:237. Jancz., Mon. Gros.308. Am. For. 22:469, 471. (*R. prostratum* L'Hérit., *R. rigens* Michx.) Nfdl. to B. C., s. to Mich. and Minn. and in the mts. to N. C. Intr. 1777. Zone II or I.

A closely related species also of prostrate habit is **R. laxiflòrum** Pursh. Lvs. deeply 5-lobed, slightly pubescent beneath; sepals longer, pubescent outside, not glandular; petals as broad as long: fr. dark purple, bloomy, glandular. S.H.1:f. 268b. Jancz., Mon. Gros.307;suppl.5:728. Alaska to n. Calif. Intr. 1818. Zone IV.—Var. **japónicum** Jancz. from Japan is apparently not yet intr.—Another related species is **R. colcradénse** Cov. Young brts. puberulous; lvs. glabrous beneath or sparingly pubescent on the veins; sepals pubescent and glandular outside; petals nearly twice as broad as long: fr. black, not bloomy, sparingly glandular. Jancz., Mon. Gros.310;suppl.5:727. (*R. laxiflorum* var. *c.* Jancz.) Colo., N. Mex. Intr. 1905. Zone V?

Sect. 12. Ribesia Berl., emend. Jancz. Racemes pendulous or spreading, usually many-fld.; fls. rotate to turbinate, rarely campanulate, green, reddish or purple: fr. red or purple, rarely black: buds with scarious scales: upright, rarely prostrate shrubs with cristalline glands.

23. **R. rúbrum** L. Northern Red Currant. Shrub to 2 m.; young growth usually glabrous: lvs. suborbicular, truncate or rarely subcordate, to 12 cm. wide, 3–5-lobed, with serrate-dentate, acutish or obtusish lobes, usually nearly glabrous: racemes usually spreading; pedicels short; bracts very small: fls. greenish brown; receptacle nearly cup-shaped, without prominent ring or projections inside; anthers with contiguous cells: fr. usually red, the dried remnants of the fl. circular at base. S.E.4:t.522. Jancz., Mon.

Gros.287, 288. (*R. sylvestre* Syme, *R. vulgare* Lam., *R. spicatum* Robs., *R. scandicum* Hedl.) C. and N. Eu., N. Asia. Long cult. Zone IV or III.—Var. **pubéscens** Swartz. Young brts. slightly pubescent: lvs. pubescent beneath: fls. brownish or pinkish: fr. small. (*R. Schlechtendalii* Lge.) N. Eu.—This species is rare in cult. outside of botanical collections and of the gardens of n. Eu., where forms with red, pinkish or whitish frs. are cult.

R. r. × *sativum* = **R. Houghtoniànum** Jancz. (Jancz., Mon. Gros.479) to which several garden forms belong.—*R. r.* × *petraeum caucasicum* = **R. holoseríceum** Otto & Dietr. Lvs. pubescent beneath: fls. reddish or brownish: fr. blackish purple. Jancz., Mon. Gros.483(fl).—Var. **pállidum** Rehd., a hybrid with *R. petraeum bullatum* has the lvs. slightly pubescent beneath, pale fls. or tinged brownish and usually larger red fr. Jancz., Mon. Gros.481, 482. (*R. p.* Otto & Dietr.)—*R. h.* × *sativum* = *R. recens;* see under No. 24.

A closely related species is **R. Warscewíczii** Jancz. Lvs. slightly pubescent beneath, chiefly on the veins, cordate at base: fls. pinkish; receptacle with a slightly elevated ring inside: fr. blackish purple, acid. Jancz., Mon. Gros.285, 286. V.F.133. E. Siber. Intr. about 1860. Zone V.—*R. W.* × *sativum* = *R. futùrum;* see under No. 24.

24. **R. satîvum** Syme. Garden Currant. Upright shrub to 1.5 m.; young growth pubescent and slightly glandular: lvs. suborbicular, cordate or subcordate, 3–7 cm. wide, 3–5-lobed, with short acutish serrate lobes, pubescent at least on the veins beneath: racemes drooping, many-fld., glabrous or nearly so; pedicels filiform, much longer than the bracts; receptacle saucer-shaped, green or slightly purple, inside with an elevated 5-angled ring; anthers with a broad connective separating the cells: fr. usually red, juicy, the dried remnants of the fl. 5-angled at base. S.E.4:t.520(c). B.B.2:237. Jancz., Mon. Gros. 277, 278, 280. (*R. hortense* Hedl., *R. domesticum* Jancz., *R. vulgare* Jancz., not Lam., *R. rubrum* auth., not L.) W. Eu. Cult. 1600. Zone V and IV.—Var. **variegàtum** Rehd. Lvs. variegated or bordered irregularly with white or yellowish. S.O.2:t.93,f.(c). (*R. rubrum* var. *v.* West.)—Var. **macrocárpum** Bailey. Of irregular habit on account of the lateral brts. being partly without buds: leaves large, deeply cordate, 3-lobed, with a large middle lobe: racemes without leaves at the base: fr. large always red. (*R. vulgare* var. *m.* Jancz.) Jancz., Mon. Gros.281, 282. To this var. belong the large-fruited "Cherry Currants."—Cult. in many varieties for its fr. which is eaten fresh or made into preserves.

Hybrids of this species are **R. Gonduíni** Jancz. (*R. s.* × *petraeum.*) Jancz., Mon. Gros.484, 485.—**R. Koehneànum** Jancz. (*R. s.* × *multiflorum.*) Jancz., Mon. Gros.486.—**R. futùrum** Jancz. (*R. s.* × *Warscewiczii.*)—**R. recens** Jancz., (*R. s.* × *holosericeum.*) Jancz., Mon. Gros.suppl.1:67.

25. **R. triste** Pall. Swamp Red Currant. Shrub with creeping or ascending often rooting stems: young growth sparingly pubescent and sparingly glandular: lvs. thin, suborbicular, cordate with a wide sinus, 5–10 cm. wide, 3–5-lobed, with acute or obtuse coarsely serrate lobes, glabrous above and light green with conspicuous veins, nearly glabrous beneath or pubescent; petioles usually pubescent, mostly shorter than blade: racemes drooping, to 3.5 cm. long, glandular, otherwise nearly glabrous; fls. purplish or purple, rotate; sepals spreading, obtuse; anther-cells contiguous; fr. red, smooth, 6–8 mm. across. Jancz., Mon. Gros. 283. S.H.1:f.267g. (*R. albinervium* Michx., *R. ciliosum* Howell.) Nfdl. to Alaska, s. to N. Y., Mich. and Ore.; N. Asia. Intr. 1820. Zone V or IV?—Var. **alaskànum** Berger. Stems upright: lvs. cordate, with mostly obtuse lobes and rounded mucronulate teeth, glabrous: racemes 3–6 cm. long; fls. dark brown-red. N. Y. State Agr. Exp. Sta. Tech. Bull. 109:t.2. Alaska. Intr. 1914.

26. **R. multiflòrum** Kit. Upright shrub to 2 m., with stout brs.; young brts. pubescent; buds large: lvs. roundish, subcordate or truncate, to 10 cm.

wide, 3–5-lobed, with acute or obtusish crenate-dentate lobes, densely grayish pubescent beneath, pubescent above while young; petioles pubescent, shorter than the blade: racemes pendulous, dense, to 12 cm. long, sometimes to 50-fld.; pedicels stout; fls. greenish yellow; receptacle saucer-shaped, inside with an elevated ring bearing 5 warts; sepals reflexed; stamens and style exserted, equaling the sepals: fr. dark red, glabrous. B.M.2368(c). R.I.23: t.138a(c). L.I.t.31. Jancz., Mon. Gros.274. E. Eu. Intr. about 1818. Zone V.—Stout upright shrub conspicuous with its long and dense racemes of greenish yellow flowers; easily distinguished by the exserted stamens.

R. m. × *petraeum* = **R. urceolàtum** Tausch. Similar to *R. multiflorum*, but fls. reddish and broad-campanulate; stamens slightly shorter than sepals. Jancz., Mon. Gros.487;suppl.1:70. Orig. before 1838.—*R. m.* × *sativum* = *R. Koehneanum;* see under No. 24.

A closely related species is **R. manshùricum** Komar. Lvs. large, usually 3-lobed, with often acute or acuminate lobes, glabrous or pubescent beneath: racemes to 20 cm. long; receptacle inside with 5 warts not connected by an elevated ring. Jancz., Mon. Gros.275;suppl.5:718. N. E. Asia. Cult. 1906.

27. **R. petraèum** Wulf. Upright shrub to 2 m.; young brts. usually glabrous: lvs. roundish, subcordate or truncate, 7–10 cm. wide, usually 3-lobed with acutish lobes, rugose and pubescent above while young, pubescent beneath at least on the veins; petioles pubescent, mostly shorter than blade: racemes rather dense, to 8 or 10 cm. long; pedicels short; fls. red or pink; receptacle broad-campanulate; sepals short, rounded, ciliate, spreading; petals nearly half as long as sepals, with a callosity below the base; stamens inserted below the petals, slightly longer than petals; ovary conical at apex, half-superior: fr. dark red, acid. R.I.23:t.138(c). S.O.2:t.94(c). Mts. of W. and C. Eu. Cult. 1794. Zone V.—Var. **bullàtum** Schneid. with the lvs. bullate above is the typical form. (*R. b.* Otto & Dietr.)—Var. **carpáthicum** Schneid. Lvs. plane above, glabrescent: racemes looser and smaller. (*R. c.* Kit.) Carpath. Mts. Cult. 1838.—Var. **Biebersteinii** Schneid. Lvs. cordate, usually 5-lobed, with short obtuse lobes, not rugose, usually densely pubescent beneath: racemes long; fls. reddish: fr. dark purple. (*R. B.* Berl., *R. caucasicum* Bieb., not Adams, *R. petraeum* var. *caucasicum* Jancz.) Cauc. Cult. 1840.—Var. **atropurpúreum** Schneid. Lvs. usually 3-lobed, with acutish lobes, to 12 cm. wide, glabrescent or pubescent beneath, not rugose: racemes short; fls. purple, the disk without callosities: fr. blackish purple. Jancz., Mon. Gros. suppl.5:720. (*R. a.* C. A. Mey.) Siberia. Cult. 1878.—Var. **altíssimum** Jancz. Lvs. 3–5-lobed: racemes 5–7 cm. long; fls. small, paler red. Jancz., l.c.721. Siberia. Cult. 1910.—Var. **tomentòsum** Maxim. Lvs. with elongated often subacuminate lobes, pubescent beneath: fls. pale: fr. pale red. Jancz., l.c.722. Manch. Cult. 1913.

R. p. × *rubrum* = *R. Houghtonianum;* see under No. 23.—*R. p.* × *sativum* = *R. Gonduini;* see under No. 24.—*R. p.* × *multiflorum* = *R. urceolatum;* see under No. 26.

Related species are: **R. latifòlium** Jancz. Young brts. pubescent and stipitate-glandular: lvs. 3–5-lobed, to 18 cm. wide, cordate or subcordate, with often acute or acuminate lobes, pubescent or glabrous beneath: racemes 3–6 cm. long, loose; fls. greenish, often tinged red, subcampanulate, slightly pubescent; stamens inserted at the same height and about as long as petals; ovary inferior: fr. red. Jancz., l.c.723. (*R. petraeum* var. *tomentosum* Maxim., partly.) N. E. Asia. Cult. 1907.—**R. emodénse** Rehd. Young brts. glabrous, red while young: lvs. cordate, to 12 cm. wide, 3–5-lobed, with usually acute lobes, glandular, rarely pubescent beneath: racemes to 12 cm. long; fls. greenish, tinged purple, subcampanulate, pubescent or nearly glabrous; sepals broad-obovate, usually spreading; style as long as stamens: fr. red or black. Jacquemont, Voy. Inde,4:t.67. Jancz., Mon. Gros.296. (*R. himalayense* and *R. himalense* Decne., not Royle.) Himal., C. China. Intr. 1908. Zone VI?—Var. **urceolàtum** Rehd. Fls. urceolate. Jancz. Mon. Gros.297.

W. China, Sikkim. Cult. 1900.—Var. **verruculòsum** Rehd. Lvs. smaller, on the veins beneath and petiole with small wart-like excrescences: fr. red, edible. N. China. Intr. 1921.—**R. Meỳeri** Maxim. Young brts. glabrous, reddish: lvs. cordate, to 9 cm. wide, usually 5-lobed, with acutish or obtuse lobes, glabrous: racemes horizontal, 3–5 cm. long, loose, glabrous; fls. tubular-campanulate, nearly sessile, reddish; sepals upright; style longer than stamens: fr. black, lustrous. Jancz., Mon. Gros.298;suppl.5:725. C. Asia to N. W. China. Intr. about 1882. Zone V.

28. **R. moupinénse** Franch. Shrub to 5 m.; young brts. glabrous: lvs. cordate to truncate, usually 3-, sometimes 5-lobed, to 16 cm. wide, with acute or acuminate lobes, with gland-tipped hairs above and below, otherwise glabrous: racemes pendulous, short or to 12 cm. long; fls. sessile, turbinate-campanulate, red or greenish and tinged red; sepals upright oval, glabrous; stamens half as long as sepals; style shorter than stamens: fr. black, lustrous. Jancz., Mon. Gros. 299. (*R. tripartitum* Batal.) W. China. Intr. 1908. Zone V.—Vigorous shrub with large foliage.

29. **R. longeracemòsum** Franch. Shrub to 3 m.; brts. glabrous: lvs. cordate, to 14 cm. long and wide, 3–5-lobed, with acute or acuminate lobes, glabrous: racemes pendulous, to 30 cm. long, nearly glabrous, very slender, with remote, greenish or reddish fls. tubular-campanulate; pedicels 5–7 mm. long; bracts about half as long, ovate; sepals upright, ovate, much shorter than tube; stamens and style exserted: fr. black. Jancz., Mon. Gros. 301. W. China. Intr. 1908. Zone V.—Var. **Wilsònii** Jancz. Young brts. red: racemes shorter; fls. salmon-red. C. China. Intr. 1907.—Vigorous shrub with large lvs.; remarkable for its very long and slender racemes.

Subgen. III. GROSSULARIOIDES Jancz. (*Limnobotrys* Rydb.) Shrubs with spines and prickles: fls. perfect, in pendulous 6–20-fld. racemes; pedicels jointed beneath the ovary; bractlets minute or obsolete; fls. saucer-shaped: fr. black or red, glandular-bristly, disarticulating from the pedicel: buds with scarious scales.

Sect. 13. GROSSULARIOIDES. Characters of subgenus.

30. **R. lacùstre** Poir. Shrub to 1 m., with slender weak stems; brs. with slender usually clustered nodal spines and numerous scattered bristles: lvs. nearly orbicular, cordate, 3–6 cm. wide, with acutish incisely dentate lobes, glabrous or nearly so; petioles about as long as blade: racemes pendulous, 5–9 cm. long, 12–20-fld.; pedicels slender, about 5 mm. long; fls. greenish or purplish; receptacle crateriform; sepals spreading, short and broad; petals much broader than long: fr. purple-black, glandular-bristly. B.M.6492(c). L.B.9:884(c). Card. Bush Fr. f.95. Jancz., Mon. Gros. 353. (*R. grossularioides* Michx., *R. echinatum* Dougl., *Limnobotrys lacustris* Rydb.) Nfdl. to Alaska, s. to Pa., Mich., Minn., Colo. and n. Calif. Intr. 1812. Zone IV or III?—Var. **párvulum** Gray. Stems usually only slightly bristly: lvs. with obtusish lobes, the terminal one scarcely longer than the lateral ones. (*R. p.* Rydb.) Intr. 1918. — A graceful shrub very attractive with the slender racemes of brownish red flowers.

Closely related species are: **R. hórridum** Rupr. Brts. yellowish, with more numerous spines and densely bristly: petioles and lvs. on both sides setose-bristly: racemes 6–7-fld. (*R. lacustre* var. *h.* Jancz.) N. E. Asia. Intr. 1918. Zone V.—**R. montígenum** McClatchie. Lvs. smaller, 1.5–4 cm. wide, pubescent and glandular: racemes 6–10-fld.; pedicels 2–5 mm. long: fr. red, glandular-bristly. Jancz., Mon. Gros.355. (*R. lacustre* var. *molle* Gray, *R. lentum* Cov. & Rose, *Limnobotrys montigena* Rydb.) Wash. and Mont. to Calif., Ariz. and N. Mex. Cult. 1905. Zone V.

Subgen. IV. GROSSULARIA Rich. (*Grossularia* Mill.) Fls. perfect, in small, 1–4-fld. racemes; pedicels not jointed; receptacle turbinate to tubular, never rotate: fr. not disarticulating: buds with scarious scales: brs. with nodal spines, rarely nearly wanting, and often with bristles.

Sect. 14. EUGROSSULARIA Engl. Petals flat or somewhat concave; anthers obtuse, never glandular; style pubescent or glabrous: fls. greenish, whitish or purple, rarely red.

31. **R. níveum** Lindl. Shrub to 3 m., with upright or ascending brs.; brts. reddish brown with stout brown spines 1–2 cm. long, without bristles: lvs. thin, suborbicular, 2–3.5 cm. wide, 3–5-lobed, with short obtusish, few-toothed lobes, sparingly pubescent or glabrous: fls. 1–4, white, on slender peduncles; bracts ovate, much shorter than the filiform pedicels; ovary glabrous; receptacle campanulate; sepals narrowly lanceolate, 6–8 mm. long; filaments pubescent, longer than the sepals: fr. bluish-black, glabrous. B.M. 8849(c). B.R.1962(c). (*Grossularia nivea* Spach.) Idaho and Wash. to Nev. Intr. 1826. Zone V.—A slender-branched shrub, attractive in bloom with its numerous small white flowers.

R. n. × ? *inerme* = **R. robústum** Jancz. Vigorous shrub with small spines: fls. white or pinkish; sepals broader and shorter and filaments shorter and less pubescent than in *R. niveum*. Jancz., Mon. Gros.499. Orig. before 1890.—*R. n.* × *divaricatum* = **R. succirúbrum** Zabel. Lvs. similar to those of *R. niveum*: fls. pink or pinkish; stamens 1½ times as long as sepals: fr. black, slightly bloomy. Jancz., Mon. Gros.500. Orig. in 1888.

32. **R. curvàtum** Small. Diffusely branched shrub to 1 m., with slender reddish brown brs.; spines slender, 4–6 mm. long: lvs. suborbicular, cuneate to subcordate, 1–3 cm. wide, 3–5-lobed with obtusish toothed lobes, sparingly pubescent; petioles slender, as long or shorter than blade: fls. 1–5, white, on slender peduncles; bracts often 3-lobed, ciliate; ovary glandular or pubescent; receptacle broad-campanulate; sepals linear-lanceolate, 6–7 mm. long, revolute; stamens as long as sepals; filaments villous: fr. greenish, glabrous. Jancz., Mon. Gros.395. (*Grossularia curvata* Small, *G. campestris* Small.) Ga. to La. and Tex. Intr. before 1898. Zone V.—Graceful shrub smaller and more spreading than the preceding species.

A closely related species is **R. echinéllum** Rehd. Brts. grayish; nodal spines 1–3, to 15 mm. long: lvs. 6–15 mm. long, finely pubescent; receptacle cylindric-campanulate, 4 mm. long; ovary densely glandular-bristly: fr. very spiny, 2–3 cm. across. Jour. Agric. Research,28:t.1. (*Grossularia echinella* Cov.) Fla. Intr. 1925.

33. **R. missouriénse** Nutt. Shrub to 2 m., with grayish or whitish sometimes bristly brs.; spines 2 cm. long or less: lvs. suborbicular, broad-cuneate to subcordate, 2–6 cm. wide, 3–5-lobed, with coarsely dentate obtusish lobes, pubescent beneath: fls. greenish white, 2–3 on a slender peduncle; pedicels much longer than bracts; ovary glabrous; sepals linear, 2–3 times as long as the cylindric-campanulate pubescent receptacle, pubescent or glabrous; filaments glabrous, nearly twice as long as sepals, pubescent below: fr. glabrous, 8–15 mm. across, purplish, subacid. B.B.2:240. Card, Bush Fr. f.86 (as *R. gracile*). Jancz., Mon. Gros.392 (as *R. rotundifolium*). (*R. gracile* Pursh, not Michx., *Grossularia missouriensis* Cov. & Brit.) Ill. to Minn., S. D., Kans., Mo. and Tenn. Cult. 1907. Zone V.—A shrub similar to *R. niveum*, but fls. smaller and more greenish.

R. m. × *hirtellum* = *R. arcuatum;* see under No. 36.

34. **R. setôsum** Lindl. Shrub to 1 m., with reddish brown, usually bristly brs.; spines subulate, to 2 cm. long: lvs. cordate to truncate, rarely cuneate, 1–4 cm. broad, 3–5-lobed, with dentate lobes, finely pubescent and somewhat glandular: fls. 1–3, white; bracts somewhat shorter than pedicels; ovary glabrous or slightly glandular; receptacle cylindric-campanulate, about twice as long as the recurved sepals; petals and stamens ½ or ⅔ as long as sepals: fr. red to black, glabrous or somewhat bristly. B.R.1237(c). B.B.2:240. Card, Bush Fr.f.91. (*Grossularia setosa* Cov. & Brit., *R. saximontanum* E. Nels.) Idaho to Assin., S. Dak. and Wyo. Intr. 1810. Zone IV or II.

A closely related species is **R. cognàtum** Greene. Brs. white or buff-colored, usually bristly: receptacle greenish white, sparingly hirsute, ⅓ longer or nearly as long as the white or pink sepals: fr. smooth. Card, Bush Fr.f.90(as *R. irriguum*). (*Grossularia cognata* Cov. & Brit.) Wash. and Ore. Intr. 1909. Zone V.

35. **R. oxyacanthoìdes** L. Low shrub, with slender often reclining brs. usually bristly, with stout spines 1 cm. or less long: lvs. cordate to broad-cuneate, 2–4 cm. wide, deeply 5-lobed with dentate lobes, slightly pubescent or nearly glabrous, usually rugose at maturity: peduncles very short, scarcely exceeding the bud-scales, 1–2-fld.; pedicels short; fls. greenish white; sepals narrow-oblong, 2.5–4 mm. long, little longer than the receptacle; stamens and petals ⅔ as long as sepals: fr. red, smooth, about 1 cm. across. B.B. 2:240. L.A.2:f.715. (*Grossularia o.* Cov. & Brit.) Hudson Bay to B. C., s. to Mich., N. Dak. and Mont. Intr. 1705. Zone I?—Rare in cult. and of no particular ornamental value.

A closely related species is **R. irríguum** Dougl. Shrub to 3 m.; brs. often without bristles, usually gray: lvs. usually cordate, 3–7 cm. wide, 3–5-lobed, glabrous or nearly so above, pubescent and minutely glandular beneath: peduncles elongated, nodding, 1–3-fld.; sepals 5–8 mm. long, about twice as long as petals and stamens and nearly twice as long as the greenish receptacle. L.A.2:f.721. Jancz., Mon. Gros.f.110c. (*R. divaricatum* var. *i.* Gray, *R. leucoderme* Heller, *Grossularia irrigua* Cov. & Brit.) B. C. to Ore., Idaho and Mont. Intr. 1920. Zone V or III.

36. **R. hirtéllum** Michx. Shrub to 1 m., with slender, sometimes bristly brs., glabrous and gray when young, dark brown when older; spines wanting or small: lvs. ovate-orbicular or reniform-orbicular, usually broad-cuneate, 2–6 cm. broad, incisely 3–5-lobed, with acute dentate lobes, glabrous or sparingly pubescent; petioles slender, often with long hairs: fls. 1–3; bracts much shorter than pedicels; ovary glabrous, rarely pubescent or with stalked glands; receptacle greenish, narrow-campanulate, about as long as the green or purplish, spreading or upright sepals; stamens about as long as sepals; petals half as long: fr. purple or black, 8–10 mm. across, usually glabrous. B.M.6892(c, as *R. oxyacanthoides*). B.B.2:241. Card, Bush Fr. f.92 (as *R. oxyacanthoides*). B.C.3:f.1665–1667;5:2960. (*R. saxosum* Hook., *R. oxyacanthoides* of most auth., *R. gracile* Jancz., not Michx., *Grossularia hirtella* Cov. & Brit.) Nfdl. to Pa. and W. Va., S. Dak. and Man. Intr. 1812. Zone IV or III?—This is the most important edible native gooseberry, one of the best known improved forms being "Pale Red" which orig. about 1847.

Varieties as "Downing" (B.C.3:f.1668), "Houghton," "Smith" are referred to **R. rústicum** Jancz., apparently a hybrid with *R. grossularia* and differing chiefly in its broader sepals and pubescent ovary. Jancz., Mon. Gros.496. Orig. about 1853 (Downing).—*R. h.* × *missouriense* = **R. arcuàtum** Jancz. Fls. whitish or slightly purple; sepals narrow-oblong, longer than the receptacle; stamens sometimes longer than the sepals: fr. red. Jancz., Mon. Gros.498. Orig. before 1907.

37. **R. rotundifòlium** Michx. Shrub to 1 m., usually lower, with slender brown brs.; spines few and small: lvs. broad-cuneate to subcordate, 2–5 cm. wide, usually 3-lobed with coarsely dentate obtusish lobes, minutely pubescent or nearly glabrous; petioles usually shorter than blade: fls. 1–3, greenish purple; peduncles slender; pedicels much longer than bracts; sepals narrow, about twice as long as the campanulate receptacle; stamens somewhat longer than sepals: fr. purplish, smooth, 6–8 mm. across. G.O.t.3(c). L.B.11:1094(c). B.B.2:241. Card, Bush Fr. f.88. (*R. triflorum* Willd., *Grossularia rotundifolia* Cov. & Brit.) Mass. to N. Y. and N. C. Cult. 1809. Zone V.—Often confused with the following species.

38. **R. divaricàtum** Dougl. Shrub to 3 m., with gray or brown, sometimes bristly brs.; spines usually stout, 1–2 cm. long, sometimes wanting: lvs. cordate to subtruncate, 2–6 cm. wide, usually 5-lobed, with coarsely crenate-

dentate obtusish lobes, pubescent beneath along the veins or glabrous: fls. 2–4, greenish purple; peduncles slender, about as long as petioles; ovary glabrous; sepals oblong, 2–3 times as long as the campanulate receptacle; petals white or purplish less than half as long as sepals; stamens somewhat longer than sepals: fr. black or dark purple, about 1 cm. across. B.R.1359(c). Card, Bush Fr. f.87. Jancz., Mon. Gros.390. (*Grossularia divaricata* Cov. & Brit.) B. C. to Calif. Intr. 1826. Zone V.—Var. **pubiflòrum** Koehne. The more vigorous stems bristly: lvs. pubescent: flowers sparingly villous, smaller.

R. d. × *niveum* = *R. succirubrum;* see under No. 31.—*R. d.* × *Lobbii* = *R. Knightii;* see under No. 46.

39. **R. inérme** Rydb. Shrub to 2 m.: brs. with few small spines less than 1 cm. long, sometimes unarmed, rarely with few bristles: lvs. cordate to truncate, 1–6 cm. wide, 3–5-lobed with crenate-dentate obtusish lobes, glabrous or sometimes pubescent and glandular: fls. 1–4, green or purplish; peduncles mostly shorter than petioles; bracts much shorter than pedicels; ovary glabrous; sepals oblong, reflexed during anthesis, slightly shorter than the narrow-campanulate receptacle; petals pink or white, about ⅓ as long as sepals; stamens shorter than sepals: fr. purplish red, smooth, about 8 mm. across, edible. Jancz., Mon. Gros.f.110 (except c). (*R. vallicola* Greene, *R. oxyacanthoides* Jancz., partly, *Grossularia inermis* Cov. & Brit.) Mont. to B. C., s. to N. Mex. and Calif. Cult. 1899. Zone V.

R. i. × *niveum* = *R. robustum;* see under No. 31.

40. **R. Grossulària** L. Shrub to 1 m.; brs. sometimes bristly, with stout spines about 1 cm. long and mostly 3-parted; lvs. cordate to broad-cuneate, 2–6 cm. wide, 3–5-lobed with crenulate-dentate obtusish lobes, glabrous or pubescent, of firm texture: fls. 1–2, greenish; ovary pubescent and often glandular-villous; sepals usually pubescent, about as long as the short-campanulate receptacle; stamens shorter than sepals: fr. globose to ovoid, pubescent and glandular-bristly or smooth, red, yellow or green. S.O.2:t.99(c). S.E.4:t.518(c). R.I.23:t.134(c). Card, Bush Fr.f.93. B.C.3,f.1663. (*R. reclinatum* L., *Grossularia reclinata* Mill.) Eu., N. Afr., Cauc. Cult. 1500. Zone V or IV.—Var. **uva-críspa** Sm. Low shrub with pubescent brs., pubescent lvs.; the tomentose ovary without or with few glands: fr. small, yellow, pubescent. (Var. *pubescens* W. D. Koch, *R. uva-crispa* L.) S.O.2:t.100(c).—This species is the parent of the European gooseberries of which a large number of garden forms are in cultivation, varying greatly in size, color and pubescence of the fr.

R. G. × *stenocarpum* = **R. vítreum** Jancz. Similar to *R. Grossularia uva-crispa;* ovary with only a few hairs near base: fr. greenish, transparent, tinged red, persisting till Oct. Jancz., Mon. Gros. Suppl.4:613. Orig. before 1909.—*R. G.* × *cynosbati* = **R. ùtile** Jancz. Mountain Gooseberry. Lvs. similar to those of *R. Grossularia*: fls. pale, slightly pubescent; sepals somewhat shorter than receptacle; style as long as stamens: fr. red, sometimes with a few spines. Jancz., Mon. Gros.495. Orig. before 1896.—*R. G.* × *sanguineum* = *R. fonteneyense;* see under No. 13.—*R. G.* × *nigrum* = *R. Culverwellii;* see under No. 21.—*R. G.* × *hirtellum* = *R. rusticum;* see under No. 36.

41. **R. cynósbati** L. Shrub to 1.5 m. high, usually lower; spines slender, 1 cm. or less long, simple or 3-parted, often wanting; bristles few or none: lvs. truncate to cordate, 3–5 cm. wide, deeply 3–5-lobed with crenately or incisely dentate lobes, usually somewhat pubescent; petioles shorter than

blade, usually pubescent: fls. 1–3, green, glabrous; peduncles and pedicels slender; ovary setose; sepals broad, shorter than the broad-campanulate receptacle; stamens little longer than petals, shorter than sepals: fr. globose to ellipsoid, prickly, wine-colored, edible. S.O.2:t.98(c). B.B.2:239. Card, Bush Fr. f.94. B.C.5:2961. (*R. gracile* Michx., *Grossularia c.* Mill.) N. B. to Manit., s. to N. C., Ala. and Mo. Intr. 1759. Zone IV or II.—Var. **inérme** Rehd. Fr. smooth, without prickles.—Var. **glabràtum** Fern. Lvs. glabrous or only sparingly pilose on the veins.

R. c. × *Grossularia* = *R. utile;* see under No. 40.

42. **R. bureiénse** Fr. Schmidt. Shrub to 1 m. or less; brs. usually very bristly and with small nodal prickles: lvs. cordate to subcordate, 2–6 cm. wide, deeply 3–5-lobed with dentate obtuse lobes, pubescent and glandular: fls. 1–2, pale or reddish brown; peduncle 3–6 mm. long; sepals oblong, longer than the broad-campanulate receptacle; petals rhombic, obtuse; stamens longer than petals; style glabrous, divided only at apex: fr. about 1 cm. across, green, prickly, edible. Jancz., Mon. Gros.371. (*Grossularia burejensis* Berger.) N. E. Asia. Cult. 1903. Zone V or III.

A closely related species is **R. aciculàre** Sm. Nodal spines 5–7, small; lvs. glabrous, lustrous above, rarely pubescent and glandular; peduncles to 1 cm. long; fls. pale or pinkish; stamens exceeding the obovate petals only by the anthers; ovary smooth and glabrous, or sometimes glandular-bristly; style divided to the middle: fr. red, green or yellow. Jancz., Mon. Gros.373. Ledebour, Icon. Fl. Ross. t.230. (*Grossularia acicularis* Spach.) Siber. Cult. 1903. Zone V or III?

43. **R. alpéstre** Decne. Upright shrub to 3 m.; brs. with stout spines to 2 cm. long and usually 3-parted, often bristly: lvs. cordate to truncate, 2–5 cm. wide, 3–5-lobed with incisely dentate obtusish lobes, slightly pubescent or nearly glabrous: fls. 1–2, greenish or sometimes reddish, on short peduncles; ovary glandular-bristly; sepals oblong, about as long as the campanulate glandular receptacle; petals, white, upright, connivent, elliptic, acutish, half as long as sepals; stamens exceeding the petals by the anthers; anthers with a cup-shaped apical gland; style longer than stamens: fr. subglobose or ellipsoid, to 1.6 cm. long, purple, glandular-bristly. Jacquemont, Voy. Inde, 4:t.75. Jancz., Mon. Gros.376. (*Grossularia alpestris* Berger.) Himal., W. China. Intr. 1902. Zone V.—Var. **gigantèum** Jancz. Shrub to 5 m., with stout spines to 3 cm. long: fls. glabrous: fr. smooth, green. W. China. Intr. 1908. Zone V.—Used in China as a hedge plant and forming very dense tall hedges.

Related species are: **R. grossularioìdes** Maxim. Shrub to 2 m.; brs. bristly, glandular-bristly or glabrous: lvs. to 4 cm. broad, glabrous or slightly stipitate-glandular: peduncle about 1.5 cm. long; style as long as stamens; anthers without apical gland: fr. glabrous, red. Jancz., Mon. Gros.377. (*Grossularia g.* Berger.) Japan. Intr. 1881. Zone V?—**R. stenocárpum** Maxim. Shrub to 2 m.: lvs. somewhat smaller; anthers without apical gland: fr. oblong, 2–2.5 cm. long, greenish and tinged reddish, somewhat transparent, glabrous in the cult. form. Jancz., Mon. Gros.375. (*Grossularia stenocarpa* Berger.) N. W. China. Cult. 1903. Zone V.—*R. s.* × *Grossularia* = *R. vitreum;* see under No. 40.

44. **R. leptânthum** Gray. Slender shrub to 2 m.; brs. smooth or bristly with nodal spines about 1 cm. long: lvs. truncate to open-cordate, 0.5–2 cm. wide, 3- or 5-cleft with crenate-dentate lobes, glabrous or pubescent and somewhat glandular; petioles as long or shorter than blade: fls. greenish-white, 1–2 on a slender peduncle; pedicels short or wanting; ovary glabrous or sometimes glandular-pubescent; sepals oblong, greenish-white, about as long as the nearly cylindric greenish receptacle; petals white or pinkish, about half as long as the sepals and as long as the stamens; style glabrous, exserted, bifid at the apex: fr. black, lustrous, smooth or glandular-hispid.

Gt.53:409. Jancz., Mon. Gros.379. (*Grossularia leptantha* Cov. & Brit.) Colo. to N. Mex. and Utah. Intr. 1893. Zone V.—Graceful and attractive shrub.

A closely related species is **R. quercetòrum** Greene. Fls. 2–4, yellow; peduncles pubescent; pedicels exceeding the bracts; petals slightly longer than the stamens. Calif. and L. Calif. Cult. 1914. Zone VII?

45. **R. pinetòrum** Greene. Shrub to 2 m., with spreading and reclining brs., without bristles; spines 1 or 3, about 1 cm. long or less: lvs. thin, cordate, 2–3 cm. wide, usually 5-cleft with irregularly incised-dentate obtuse lobes, dull green and glabrous above, sparingly pubescent beneath, at least on the veins: fls. orange-red, 1 or rarely 2; peduncles puberulent, shorter than the petioles; ovary bristly; sepals linear-spatulate, pilose, nearly twice as long as the pilose cylindric-campanulate receptacle, ⅓ shorter than petals and stamens; style glabrous: fr. purple, 1–1.5 cm. long, prickly. Jancz., Mon. Gros. 370. (*Grossularia p.* Cov. & Brit.) Ariz., N. Mex. Intr. 1898. Zone V.—Remarkable for the orange-red color of the fls., rather unusual in the genus.

A closely related species is **R. Watsoniànum** Koehne. Lvs. deeply 3–5-lobed, 3–5 cm. wide: fls. green; sepals fully twice as long as receptacle; petals white: fr. bristly. Jancz., Mon. Gros.f.97a. Wash. Cult. 1907. Zone VI?

Sect. 15. Robsonia Bert. Petals convolute, involute or convex; anthers sagittate or obtuse and glandular, rarely glandless; style always glabrous: fls. usually red or scarlet, 5- or 4-merous: fr. bristly or glandular, never glabrous.

46. **R. Lóbbii** Gray. Shrub to 2 m.; young brts. pubescent; spines 3, 1–2 cm. long: lvs. thin, cordate or subcordate, 2–3.5 cm. wide, 3–5-lobed with crenate-dentate obtuse lobes, slightly pubescent and glandular, often glabrous above: fls. 1–2, purple-red; peduncles glandular-pubescent; bracts ovate, as long as pedicels or shorter; sepals reflexed, about 1 cm. long, 2–3 times as long as the narrow-campanulate finely pubescent receptacle; petals whitish, half as long as sepals; stamens as long as sepals; anthers ellipsoid, glandular on back: fr. ellipsoid, purple, densely stipitate-glandular. B.M. 4931(c, as *R. subvestitum*). R.H.1908:30. G.C.II:19:11. Jancz., Mon. Gros. 359. (*Grossularia L.* Cov. & Brit.) B. C. to Calif. Intr. 1852. Zone VII?

R. L. × *divaricàtum* = **R. Knìghtii** Rehd. Brts. puberulous: lvs. sparingly villous beneath, more densely on the veins: peduncle and pedicels glabrous or nearly so; receptacle campanulate, sepals about 6 mm. long: fr. sparingly glandular-setose. B. C. Cult. 1920.

47. **R. Roèzlii** Reg. Shrub to 1.5 m.; young brts. pubescent, not bristly; spines slender, to 1.5 cm. long: lvs. rather thin, truncate to subcordate, 1.5–2.5 cm. wide, 3–5-lobed with incisely crenate-dentate lobes, finely pubescent on both sides or glabrous above: fls. 1–3, purple; ovary bristly and usually white-hairy; sepals lanceolate, longer than the pilose campanulate receptacle; petals involute, erose, white, about half as long as the sepals and as long as the filaments; anthers sagittate: fr. bristly, purple, 1–1.5 cm. across. Gt.28: t.982,f.1–3(c). R.H.1899:177. (*R. amictum* Greene, *Grossularia R.* Cov. & Brit.) M. and s. Calif. Cult. 1899. Zone VI?—Var. **cruéntum** Rehd. Lvs. and fls. glabrous. B.M.8105(c). R.H.1908:32. S.L.355(h). (*R. c.* Greene, *R. amictum* var. *c.* Jancz.)—Handsome in bloom, particularly on account of the contrast between the purple calyx-tube and the white petals.

48. **R. Menzièsii** Pursh. Shrub to 2 m.; young brts. pubescent and densely bristly; spines 1–2 cm. long: lvs. firm in texture, cordate to subtruncate, 2.5–4 cm. wide, 3–5-lobed with crenate-dentate lobes, glabrous or slightly glandular above, velvety-pubescent and glandular beneath; petioles almost as long as blade: fls. 1–2, purple; peduncle slender, about as long as

petiole; bracts shorter than the pedicels; ovary glandular-bristly; sepals oblong, about 3 times as long as the campanulate glandular-pubescent receptacle; petals whitish, erose, shorter than the filaments; stamens as long as sepals; anthers sagittate: fr. globose, bristly. G.C.III.45:242. R.H.1908:31. Jancz., Mon. Gros.361, 362. (*R. subvestitum* Hook. & Arn., *Grossularia M.* Cov. & Brit.) Ore. to m. Calif. Intr. 1830. Zone VII.

A related species is **R. californicum** Hook. & Arn. Brs. without bristles: lvs. glabrous or nearly so: fls. green or purplish; ovary bristly, only the shorter bristles sometimes glandular; petals obovate, nearly half as long as filaments: fr. prickly. Jancz., Mon. Gros.f.95. Card, Bush Fr.f.83. (*R. occidentale* Hook. & Arn.) Calif. Intr. ? Zone VII?

49. **R. speciòsum** Pursh. Evergreen shrub to 4 m.; brs. usually bristly; spines stout: lvs. coriaceous, orbicular to obovate, rounded to broad-cuneate, 1–4 cm. long, 3–5-lobed or crenate-dentate, glabrous or sparingly glandular-hairy: fls. bright red, 2–4 on slender pendulous peduncles, 4-merous; sepals upright, 6–10 mm. long, as long as the convolute petals and much longer than the broad-campanulate glandular-bristly receptacle; stamens 2–4 times as long as sepals; anthers oval: fr. glandular-bristly, red. B.M.3530(c). B.R. 1557(c). B.C.5:2968. G.C.III.34:71. Gn.34:230. M.G.32:65(h). (*Grossularia speciosa* Cov. & Brit., *Robsonia speciosa* Spach.) Calif. Intr. 1828. Zone VIII?—One of the most showy gooseberries with its long pendulous bright red flowers, but tender within our area. Easily distinguished from all other species by the 4-merous flowers.

37. HAMAMELIDACEAE Lindl. WITCH-HAZEL FAMILY

Deciduous or evergreen shrubs or trees, often with stellate pubescence; buds scaly or naked; lvs. alternate, simple, stipulate, rarely estipulate: fls. usually rather small, in heads or racemes, unisexual or perfect, perigynous or epigynous; sepals 4–5, rarely 6 or 7; petals as many or wanting; stamens 4–5 or sometimes more; ovary 2-celled, with 1 or several pendulous ovules in each cell: fr. a woody 2-valved caps., with a separate inner layer of different texture; seeds often winged, albuminous, with straight embryo.—About 20 genera with 50 species chiefly in subtrop. and warm-temp. regions of both hemispheres.

A. Lvs. palmately veined, deciduous: ovary-cells with several ovules; fls. in heads: buds with 5–6 outer scales, rather large.
  B. Lvs. entire, broad-ovate: fls. in 2-fid. heads, with linear-lanceolate petals..1. *Disanthus*
  BB. Lvs. palmately lobed: fls. in many-fid. heads, apetalous.....2. *Liquidambar*
AA. Lvs. penninerved: ovary-cells 1-ovuled.
  B. Petals wanting.
    C. Lvs. deciduous, crenate-dentate.
      D. Fls. in heads or dense spikes; stamens usually more than 3; calyx-tube shorter than ovary.
        E. Stamens 5–7, pendulous, with linear-oblong anthers.....4. *Parrotia*
        EE. Stamens 10–24, with upright filaments; anthers oval.
          F. Filaments slender; infl. capitate, with large white bracts at the base. 5. *Parrotiopsis*
          FF. Filaments thickened toward the apex; infl. more or less elongated, without bracts.....6. *Fothergilla*
      DD. Fls. in long and slender racemes; stamens 5; calyx-tube urn-shaped, longer than ovary.....10. *Sinowilsonia*
    CC. Lvs. evergreen.
      D. Fls. in slender racemes; stamens 2–8; calyx-tube obsolete.....3. *Distylium*
      DD. Fls. in heads or short racemes; stamens 8–10; pistillate fls. with urceolate calyx. 9. *Sycopsis*
  BB. Petals present.
    C. Fls. in racemes, 5-merous.
      D. Petals broad: lvs. sinuate-dentate, with straight veins, each ending in a mucronate tooth.....7. *Corylopsis*
      DD. Petals subulate, minute; filaments very short: lvs. unequally denticulate, with much branched veins.....8. *Fortunearia*
    CC. Fls. in clusters, 4-merous; petals linear: lvs. wavy-toothed.....11. *Hamamelis*

1. **DISÁNTHUS** Maxim. Deciduous shrub; glabrous except the pubescent calyx; buds ovoid, acute, with 5–6 outer scales: lvs. long-petioled, palmately 5–7-nerved, entire, with small caducous stipules: fls. perfect, in axillary, short-peduncled pairs, connate back to back; calyx 5-parted; petals 5, linear-lanceolate, spreading; stamens 5, shorter than sepals; ovary superior, with 2 short styles; caps. obovoid, 2-lobed at apex, with several black glossy seeds in each cell. (Greek *dis*, twice, and *anthos*, flower, referring to the two-flowered heads.) One species in Japan.

D. cercidifòlius Maxim. Shrub to 5 m., with slender lenticellate brs.: lvs. orbicular-ovate, cordate to subcordate, obtuse or acutish, 5–12 cm. broad and usually less long, dull bluish green above, paler beneath, leathery at maturity: fls. dark purple, 1.5 cm. across; calyx pubescent, with short recurved lobes; caps. 1.5 cm. across; seeds about 5 mm. long, angular, very oblique at base. Fl.x; fr. the following Oct. B.M.8716(c). R.H.1910:363, t(c). G.F.6:215. B.C.2:1021. M.D.1900:1,t(hc). S.L.188(h). Mts. of C. Japan. Intr. 1892. Zone VI or VII.—A handsome shrub with cercis-like foliage turning in autumn to crimson-red suffused with orange; the fls. are insignificant. Seems to grow best in peaty soil and a sheltered position.

2. **LIQUIDÁMBAR** L. Deciduous trees; buds ovoid, with 5 or 6 outer scales: lvs. slender-petioled, palmately 3–7-lobed, serrate, with small stipules: fls. apetalous, usually monoecious, in globose heads; staminate fls. without perianth, intermixed with small scales, in small heads forming a terminal raceme; pistillate fls. in slender-peduncled globose heads consisting of more or less cohering 2-beaked ovaries subtended by minute scales: fruiting head globose, spiny from the persisting styles, consisting of dehiscent capsules with 1 or 2 winged seeds. (Latin *liquidus*, fluid, and Arabic *ambar*, amber; referring to the fragrant resin exuding from the bark of *L. orientalis*.) Four species in N. and C. Am. and W. and E. Asia.

A. Lvs. 5–7 lobed: fr.-head with beaked caps. and short scales.....1. *L. styraciflua*
AA. Lvs usually 3-lobed: fr.-head with slender-beaked caps. surrounded by subulate bristles 2. *L. formosana*

1. **L. Styracíflua** L. Sweet Gum. Tree to 45 m.; brs. red-brown, often developing corky ridges or thick wings: lvs. cordate or subcordate, 10–18 cm. wide and about as long, 5–7-lobed with usually oblong-triangular acuminate, finely serrate lobes, dark green and lustrous above, paler beneath and glabrous except axillary tufts in the axils of the principal veins; petioles 6–12 cm. long: fr.-heads about 3 cm. across, consisting of lustrous brown capsules surrounded at base by short obtusish scales. Fl.v; fr.x, persisting during the winter. S.S.5:t.199. Am. For. 21:783(h);22:641(b). F.E.18:90(h). Gn.24: 166(h),167. (Bilsted.) Conn. and s. N. Y. to Fla., Ill., Mo. and Mex. Intr. 1681. Zone V.—A handsome pyramidal and symmetrical tree with stout brs.; its maple-like lvs. turn deep crimson in autumn; in winter the tree is conspicuous by its usually corky brs. and the pendulous frs., also by the deeply furrowed bark of its trunk.

A related species is **L. orientàlis** Mill. Tree to 20 m.; lvs. truncate, 4–5 cm. broad, usually with 5 ovate-oblong lobulate and obscurely toothed lobes, quite glabrous: fr.-heads about 2.5 cm. across, beaks of caps. slender. H.I.11:1019. F.R.3:87. (*L. imberbe* Ait.) W. Asia. Intr. about 1750. Zone VI or VII?—Rare in cult. and of slow growth.

2. **L. formosàna** Hance. Tree to 40 m.; young brts. pubescent or glabrous: lvs. cordate to truncate, 8–15 cm. wide, 3-lobed, with broad-ovate acuminate to slender-acuminate serrate lobes, glabrous or pubescent on the veins beneath or sometimes, particularly on young plants, pubescent on the

whole under surface: fr.-heads about 3 cm. across, puberulous, of bristly appearance owing to the slender persisting styles and the subulate scales surrounding the capsules. H.I.11:t.1020. C.C.143. (*L. acerifolia* Maxim., *L. Maximowicziana* Miqu.) W. to E. China and Formosa. Intr. 1884. Zone VIII.—Var. **montícola** Rehd. & Wils. Lvs. always glabrous, usually truncate or rounded, cordate only in young seedling plants. Intr. 1907. Zone VI or VII?—Handsome pyramidal tree, similar to the *L. styraciflua*, but the brs. without corky bark.

3. **DISTŸLIUM** Sieb. & Zucc. Evergreen trees or shrubs; buds ovoid, pubescent, with 2 outer scales: lvs. short-petioled, entire or dentate, pennineryed, with deciduous stipules: fls. polygamous or dioecious, apetalous, subtended by small bracts, in axillary racemes; sepals 1–5 or wanting; stamens 2–8, almost spoon-shaped, with short filaments and flat anthers convex outside; pistillate fls. with a superior stellate-tomentose ovary and with several stamens or without; styles 2, slender, stigmatic on the inside: caps. with 1 seed in each cell. (Greek *dis*, two, and *stylos*, style; referring to the two conspicuous styles.) Six species in Japan, China and Himal.

D. racemòsum Sieb. & Zucc. Tree to 25 m., in cult. usually shrubby; brts. glabrous: lvs. elliptic to elliptic-oblong, sometimes obovate, acute or obtusish, narrowed at the base, 3–7 cm. long, glabrous: racemes stellate-pubescent, 1.5–4, in fr. to 8 cm. long; anthers red: caps. ellipsoid, 2-pointed, about 1 cm. long. Fl.III–IV; fr.VIII–X. S.Z.1:t.94(c). S.I.2:t.25(c). I.T.3:t. 113. S.L.189(h). Japan. Cult. 1870. Zone VIII?—Var. **variegàtum** Sieb. Lvs. bordered with yellowish white.—Rarely cult. and of no particular ornamental merit, though the red anthers render the staminate plant rather attractive when in bloom.

4. **PARRÓTIA** C. A. Mey. Deciduous small tree with stellate pubescence; buds stalked, with 2 outer scales, brown-tomentulose: lvs. short-petioled, sinuate-dentate, with large lanceolate caducous stipules: fls. perfect, apetalous, in dense heads surrounded by large bracts; sepals 5–7, rather large, oval, inclosing the pubescent ovary about ½; stamens 5–7, opposite the sepals; anthers linear-oblong, opening with a slit, pendulous on slender filaments; styles slender, acute, with linear stigma: caps. ovoid, with the calyx-margin near the base; seeds oblong, shining, one in each cell. (After F. W. Parrot, a German naturalist and traveler, later professor of medicine in Dorpat; 1792–1841.) One species in Persia.

P. pérsica C. A. Mey. Small tree to 5 m. with smooth flaky bark; older brts. red-brown: lvs. oval to obovate-oblong, obtuse, rounded to subcordate at base, 6–10 cm. long, coarsely crenate-dentate above the middle, stellate-pubescent on both sides; petioles 2–6 mm. long: fls. before the lvs.; the heads with the brown-tomentose bracts about 1.5 cm. across: fr. broad-ovoid, about 1 cm. long, 2-lobed at the apex, with recurved beaks. Fl.III–IV. B.M.5744(c). Gs.3:237,t(c). S.L.282(h). M.O.t.21. Cult. 1840. Zone V.—In cult. usually a shrubby tree with spreading brs. and with foliage similar to that of the Witch-Hazel, turning scarlet, orange and yellow in autumn and remaining a long time on the brs.; the dull-colored flowers are rather insignificant.

5. **PARROTIÓPSIS** Schneid. Deciduous tree, with stellate pubescence; buds stalked, with 2 exposed scales, thinly tomentose: lvs. petioled, dentate with acute teeth; stipules oval: fls. perfect, apetalous, in many-fld. heads surrounded by large bracts; sepals 5–7, small, stamens about 15; anthers

oval, yellow, opening with 2 valves, on upright slender filaments; styles slender, free, with linear stigmas: capsule ovoid, with spreading beaks, the calyx-margin below the middle. (Parrotia and Greek *opsis*, appearance; referring to its resemblance to that genus.) One species in the Himal.

P. Jacquemontiàna Rehd. Small tree to 7 m., with smooth gray bark; brts. yellowish gray, tomentulose at first: lvs. suborbicular, 5–8 cm. long, dentate with short acute or acutish teeth, light green beneath, sparingly stellate-pubescent above while young, more densely so on the veins beneath; petioles 6–12 mm. long, densely stellate-tomentose; fl.-heads with the spreading white bracts 3–5 cm. across; bracts dotted with purplish brown scurfy tomentum on the back; stamens about 5 mm. long. Fl.v. B.M.7501(c). B.S.2:123 (*P. involucrata* Schneid., *Fothergilla involucrata* Falc., *Parrotia J.* Decne.) Intr. 1879. Zone V.—Shrub similar to Parrotia, but the lvs. resembling *Alnus glutinosa* in shape and serration, changing to yellow in autumn; fls. appearing with the lvs., rather conspicuous on account of large white bracts.

6. **FOTHERGÍLLA** L. Deciduous shrubs; buds with 2 exposed scales densely stellate-pubescent, caducous: lvs. petioled, coarsely toothed, stipulate: fls. perfect, apetalous, in terminal heads or spikes, not subtended by bracts; calyx 5–7-lobed; stamens about 24, the filaments white, thickened toward the apex; anthers oval, yellow: caps. ovoid, with the calyx-margin about the middle, tomentose and setose, with stout upright or spreading beaks; seeds 1 in each cell, oblong and lustrous brown. (After John Fothergill, eminent English physician who introduced and cultivated many new plants; 1712–1780.) Four species in s. e. N. Am.

A. Lvs. rarely exceeding 2–5 cm., stellate-pubescent above: low shrub.....1. *F. Gardeni*
AA. Lvs. 5–12 cm. long, glabrous or glabrescent above; upright shrubs.
B. Lvs. glaucous beneath and more or less stellate-pubescent.....2. *F. major*
BB. Lvs. green and sparingly pubescent beneath.....3. *F. monticola*

1. **F. Gardèni** Murr. Low shrub to 1 m., with upright and spreading slender brs.: lvs. obovate to oblong, rounded or broad-cuneate, 2–5 cm. long, dentate above the middle, pale or glaucous and tomentose beneath; petioles 5–10 mm. long: fls. before the lvs.; spikes ovoid to oblong, 1.5–3 cm. long. Fl.IV–V; fr.VII–VIII. B.M.1341(c). L.B.16:1507(c). Gn.89:141(h). (*F. alnifolia* L., *F. carolina* Brit.) Va. to Ga. Intr. 1765. Zone V or VI.—Low shrub conspicuous in early spring with its numerous spikes of white flowers.

A closely related species is **F. parvifòlia** Kearney with suborbicular to oval subcordate or cordate lvs.; from N. C. to Fla. Cult. 1898. Zone VIII?

2. **F. màjor** Lodd. Upright shrub to 3 m.; brts. stout, stellate-tomentulose: lvs. suborbicular to oval or obovate, cordate or truncate, 5–10 cm. long, coarsely crenate-dentate or sometimes denticulate above the middle, dark green and glabrous above, glaucous and stellate-pubescent beneath, at least on the veins, leathery; petioles 5–10 mm. long, tomentose: fls. with the lvs.; spikes 2.5–5 cm. long, with densely brown-tomentose bracts; stamens 8–14 mm. long: fr. including the upright beaks 1 cm. long, light brown inside with red markings on the inner suture; seeds 7–8 mm. long. Fl.v; fr.IX. B.M.1342(c). L.B.16:1520(c). B.C.3:1270(fls.). M.G.17:395(h). B.S.1:561 (h). Gn.78:229;79:77(h);89:141(h). (*F. alnifolia* var. *m.* Sims.) Ga. Intr. 1780. Zone V.—An ornamental shrub of pyramidal habit very conspicuous in spring with its numerous spikes of white fls.; the lvs. turn orange-yellow in antumn.

3. **F. montícola** Ashe. Shrub to 2 m., with spreading brs.; lvs. broad-oval to obovate, usually cordate, remotely dentate, often from below the middle,

light green and sparingly pubescent beneath, often only on the veins; petioles 8–15 mm. long: spikes 3–6 cm. long: fr. with finally spreading beaks, darker inside without red markings: otherwise much like the preceding species. B.C.3: 1271. Gn.89:141(h). N. C. to Ala. Intr. 1899. Zone V.—Very similar to the preceding species, but of more spreading habit and with rather larger spikes.

7. **CORYLÓPSIS** Sieb. & Zucc. Deciduous shrubs with slender lenticellate brs., rarely small trees; buds with about 3 glabrous exposed scales, conspicuous: lvs. slender-petioled, strongly veined, dentate, stipulate: fls. perfect, yellow, sessile or nearly so, in nodding racemes appearing before the lvs., with large bracts at the base; calyx-lobes short, petals clawed, 5; stamens 5, alternating with short, entire or 2–3-parted staminodes; ovary half-superior, rarely superior; styles distinct, slender: caps. broadly obovoid, truncate at apex, with two spreading and recurved beaks, 4-valved, with 2 oblong, lustrous black seeds. (Corylus, and Greek *opsis*, likeness; alluding to the hazel-like foliage.) About 12 species in E. Asia and Himal.—All species are ornamental shrubs with handsome generally ovate leaves of moderate size and with yellow fragrant flowers appearing in nodding racemes in early spring before the lvs.

A. Young brts. and petioles pubescent: lvs. pubescent beneath, at least on the veins.
  B. Calyx and fr. glabrous.....1. *C. Wilsonii*
  BB. Calyx and fr. pubescent.
    C. Lvs. obovate to oblong-obovate: racemes 10–18-fld.; its bracts loosely silky outside. 2. *C. sinensis*
    CC. Lvs. orbicular-ovate or orbicular-obovate: racemes 7–10-fld., its bracts glabrous outside.....3. *C. spicata*
AA. Young brts. glabrous or nearly so: lvs. usually glabrous.
  B. Calyx and floral bracts except the basal ones pubescent.....4. *C. Veitchiana*
  BB. Calyx and floral bracts on back glabrous.
    C. Racemes many-fld.
      D. Blade of petals broader than, or as broad as long, petals about 4 mm. long: lvs. generally obovate.
        E. Lvs. pubescent beneath, at least on the veins: nectaries deeply bifid. 5. *C. Willmottiae*
        EE. Lvs. with scattered silky hairs when unfolding, soon quite glabrous: nectaries emarginate or truncate.....6. *C. platypetala*
      DD. Blade of petals longer than broad, petals about 8 mm. long: lvs. generally ovate. 7. *C. Gotoana*
    CC. Racemes 2–3-fld.; fls. nearly 2 cm. long.....8. *C. pauciflora*

1. **C. Wilsònii** Hemsl. Shrub or small tree; young brts. stellate-pubescent: lvs. ovate to oblong-ovate or oblong-obovate or elliptic, acuminate, cordate or subcordate, 6–12 cm. long, sinuately dentate with bristle-like teeth, glaucous and sparingly pubescent beneath, more densely on the veins; petioles densely pubescent, 1–2.5 cm. long: racemes 5–7 cm. long; all bracts densely silky-pubescent on both sides, ovate or broad-ovate, acutish or obtuse; petals narrow-spatulate, about 6 mm. long, slightly longer than stamens; nectaries truncate or slightly emarginate: fr. 1–1.2 cm. across, contracted at base into a stout stipe 3–5 mm. long; seed 1 cm. long. C. China. Intr. 1900. Zone VI or VII.

2. **C. sinénsis** Hemsl. Shrub to 5 m.; young brts. pubescent: lvs. obovate to oblong-obovate, short-acuminate, obliquely cordate or subcordate, 5–12 cm. long, sinuate-denticulate, grayish green and pubescent beneath, at least on the veins; petioles densely pubescent, 6–15 mm. long: fls. pale yellow, fragrant, in pendulous 10–18-fld. racemes 3–5 cm. long; petals orbicular-ovate, 7–8 mm. long, longer than style and stamens: fr. 7–8 mm. across, hairy. G.C.III.39:18. H.I.29:2820,f.17–20. C. and W. China. Intr. 1900. Zone VI?—Var. **glandulífera** Rehd. & Wils. With glandular-bristly brts. and petioles and with glabrous calyx. H.I.29:2819. Apparently not in cult.

3. **C. spicàta** Sieb. & Zucc. Shrub to 2 m.: young brts. pubescent: lvs. orbicular-ovate or orbicular-obovate, abruptly short-acuminate, obliquely cordate to rounded, 5–10 cm. long, sinuate-denticulate with bristle-like teeth, glaucous and pubescent beneath; petioles densely pubescent, 1–2.5 cm. long: racemes 7–10-fld., 2–4 cm. long; rhachis pubescent; fls. bright yellow, fragrant; petals obovate, about as long as stamens; anthers purple; staminodes 2-parted: fr. pubescent, 7–8 mm. across. S.Z.1:t.19(c). B.M.5458(c). F.S.20: t.2135(c). S.I.2:t.26(c). G.C.III.25:210. Japan. Intr. 1863. Zone VI?

A related species is **C. Griffíthii** Hemsl. Lvs. larger: racemes to 6 cm. long; bracts small, pubescent on both sides, the basal ones glabrous outside; stamens and style much shorter than petals. B.M.6779(c). Himal. Intr. 1879. Probably not hardy within our area.

4. **C. Veitchiàna** Bean. Shrub to 2 m.; brts. glabrous: lvs. ovate or elliptic to oblong-obovate, short-acuminate, cordate or subcordate, 5–12 cm. long, sinuately dentate, sparingly silky and purplish beneath when young, glaucous and glabrous at maturity; petioles glabrous, 6–15 mm. long: fls. primrose-yellow, fragrant, in many-fld. racemes 2.5–5 cm. long; basal bracts glabrous, the floral ones silky-pubescent outside; stamens as long or slightly longer than the oval or ovate petals; anthers red-brown; calyx hairy, with rounded lobes; staminodes 2-parted: fr. about 8 mm. across. B.M.8349(c). Gn.76:184. B.S.1:398. M.G.31:405(h). C. China. Intr. 1900. Zone (V).

5. **C. Willmóttiae** Rehd. & Wils. Shrub to 4 m.: brts. glabrous: lvs. oval or obovate, sometimes ovate, short-acuminate, subcordate to truncate, 3–8 cm. long, sinuate-dentate with mucronate teeth, pale green or glaucescent beneath, pubescent at least on the veins with long hairs or rarely villous, sometimes nearly glabrous at maturity; petioles 6–20 mm. long, glabrous or slightly pubescent; fls. soft-yellow, fragrant, in dense many-fld. racemes 5–7 cm. long; rhachis villous; petals 3–4 mm. long, with short claw and suborbicular or reniform blade; stamens much shorter than petals, about as long as styles; nectaries 2-parted, shorter than sepals: caps. about 7 mm. across. B.M. 8708(c). G.M.55:191. M.G.31:406(h). (*C. multiflora* Hort. Willmott, not Hance.) W. China. Intr. 1908. Zone VI.

6. **C. platypétala** Rehd. & Wils. Shrub to 2.5 m.; brts. glabrous, but stipitate-glandular: lvs. ovate or broad-ovate to elliptic, short-acuminate, cordate or subcordate, 5–10 cm. long, sinuate-dentate with bristle-like teeth, glaucescent beneath; petioles 1–2.5 cm. long, sparingly stipitate-glandular: fls. light yellow, fragrant, in many-fld. racemes with the stalk 3.5–5 cm. long; rhachis slightly pubescent or nearly glabrous; petals about 3–4 mm. long, with short claw and reniform or suborbicular blade, nectaries truncate or emarginate, shorter than sepals; stamens shorter than petals, longer than styles: capsule 7–9 mm. long. C. China. Intr. 1907. Zone VI.—Var. **levis** Rehd. & Wils. Young brts. and petioles without stipitate glands. W. China. Intr. 1908.

A related species is **C. yunnanénsis** Diels. Lvs. slightly pubescent beneath: floral bracts slightly silky on back; petals 6–7 mm. long, with obovate blade; stamens slightly shorter than petals; calyx-lobes ciliate, pubescent outside. S. W. China. Cult. 1910. Zone VII?

7. **C. Gotoàna** Makino. Shrub to 6 m.; young brts. glabrous: lvs. ovate, acuminate, cordate to subcordate, 3–8 cm. long, sinuate-dentate with bristle-like teeth, glaucescent beneath and sparingly silky on the veins or sometimes slightly pubescent while young, thin; petioles slender, 1.5–3 cm. long: fls. pale yellow, fragrant, in pendulous racemes 2–3 cm. long; rhachis glabrous; petals 8 mm. long, with obovate blade, slightly longer than style and stamens;

nectaries truncate or slightly emarginate, shorter than sepals: caps. about 7 mm. across. Japan. Intr. 1905. Zone V.—This is the hardiest species of the genus and in general appearance much like *C. spicata.*

8. **C. pauciflŏra** Sieb. & Zucc. Spreading shrub to 2 m.: young brts. glabrous: lvs. ovate or broad-ovate, acute, obliquely cordate to subcordate, 3–7 cm. long, sinuate-dentate with bristle-like teeth, glaucescent beneath and sparingly pubescent on the veins; petioles 5–15 mm. long, glabrous: fls. primrose yellow, nearly 2 cm. long, 2 or 3 in short spikes; bracts glabrous outside, greenish yellow; petals oblong-obovate, longer than stamens. B.M.7736(c). S.Z.1:t.20(c). S.I.2:t.26(c). B.S.1:397. G.F.5:342(h). G.W.15:101(h). Japan. Intr. 1874. Zone VI.

8. **FORTUNEÀRIA** Rehd. & Wils. Deciduous shrub; buds naked, densely stellate-tomentulose: lvs. short-petioled, dentate, with small caducous stipules: fls. andro-monoecious, short-stalked, in terminal racemes appearing with the lvs.; racemes of bisexual fls. usually with 1–3 lvs. at base; calyx turbinate, 5-lobed; petals 5, subulate, slightly shorter than calyx-lobes; stamens 5, with very short filaments; ovary partly superior; styles 2, filiform, revolute; staminate racemes short, catkin-like, developing in autumn, naked during winter, without lvs. at base; fls. with rudimentary pistil: fr. a 2-valved caps. with 2 glossy dark brown seeds; embryo with large cotyledons, revolute at the margin. (Dedicated to Robert Fortune, who traveled in China during 1843–61 and introduced many new plants.) One species in China.

F. sinénsis Rehd. & Wils. Shrub to 7 m.; brts. and petioles densely stellate-tomentulose: lvs. obovate to obovate-oblong, short-acuminate, narrowed toward the rounded or truncate base, 7–15 cm. long, unequally sinuate-denticulate with small mucronulate teeth, glabrous above, pubescent on the veins beneath; petioles 3–8 mm. long: fls. about 4 mm. across, in stellate-pubescent racemes, those of perfect fls. 3–6 cm. long; pedicels 1–3 mm. long; style longer than the stamens, revolute: caps. 1–1.2 cm. across, brown, with pale lenticels; seeds about 1 cm. long. Fl.v; fr.x–xi. C. China. Intr. 1907. Zone V.—Shrub with rather large lvs. and inconspicuous fls.; of no particular ornamental merit.

9. **SYCÓPSIS** Oliv. Evergreen trees or shrubs; buds naked, densely stellate-tomentulose: lvs. short-petioled, entire or sparingly denticulate, penninerved, with narrow caducous stipules: fls. monoecious, apetalous, small, terminal or axillary in heads or short racemes surrounded by pubescent bracts; staminate fls. with minute sepals, 8–10 stamens on slender filaments and with rudimentary ovary; pistillate fls. with urceolate, 5-lobed, stellate-pubescent calyx enclosing the superior ovary; styles distinct, slender, with decurrent linear stigmas: caps. with the irregularly splitting calyx at the base, 2-valved, with 2 brown lustrous seeds. (Greek *sykos,* fig, and *opsis,* likeness; referring to the resemblance of the shrubs to certain species of Ficus.) Six species in China, Himal. and in the Philippine Isls.

S. sinénsis Oliv. Shrub or small tree to 7 m.: lvs. elliptic-ovate to elliptic-lanceolate, acuminate, broad-cuneate, 5–10 cm. long, remotely denticulate, above the middle or entire, lustrous and glabrous above, pale green and glabrous beneath or with scattered scale-like hairs; petioles 5–10 mm. long: fls. in rather small, short-peduncled heads, surrounded by brown-tomentose bracts; stamens 10, about 1.5 cm. long; anthers oblong, red; caps. ovoid, 3–5 together, with the short beak about 1 cm. long, covered with light brown

tomentum mixed with setose hairs. Fl.II–III. H.I.20:1931;29:2834,f.1–3. B.S.2:562. G.C.III.72:91. C. and W. China. Intr. 1907. Zone VII.—Ornamental neat little shrub with rather small evergreen lvs.; the fls. are scarcely conspicuous except for the red anthers.

10. **SINOWILSÒNIA** Hemsl. Deciduous tree with stellate pubescence; buds naked, stalked, stellate-tomentulose: lvs. short-petioled, denticulate, penninerved; stipules caducous, lanceolate: fls. monoecious, apetalous, in pendulous racemes; staminate racemes catkin-like, from leafless buds; pedicels short; stamens 5, with short filaments adnate to the base of the linear-spatulate sepals disposed in an irregular whorl; ovary wanting; pistillate racemes terminal on short leafy brts.; fls. sessile; calyx-tube urceolate, pubescent, enclosing the ovary; sepals 5, spatulate, spreading; staminodes 5, with rudimentary anthers, opposite the sepals; styles free, exserted: caps. broad-ovoid, setose-strigose, enclosed partly by the calyx-tube; seeds elliptic-oblong, black. (After E. H. Wilson who traveled in China between 1900 and 1910 and introduced many new plants into cult.) One species in China.

S. Hénryi Hemsl. Tree to 8 m.; brts. stellate-pubescent: lvs. broad-ovate to elliptic, acute or short-acuminate, subcordate to truncate, 10–15 cm. long, denticulate, with fascicled hairs on both sides while young, later glabrous or nearly so above, pubescent beneath chiefly on the veins; petiole about 1 cm. long, densely pubescent: staminate catkins 4–6 cm. long; pistillate racemes 1.5–3, in fr. to 15 cm. long; calyx-tube yellowish tomentulose, about 1.5 mm. long, little longer than ovary, later much elongated; sepals 2 mm. long; caps. about 1 cm. long, with short weak beak. Fl. v; fr. x. H.I.29:2817. C. and W. China. Intr. 1908. Zone V.—Interesting shrub with large linden-like lvs., but the fls. are inconspicuous.

11. **HAMAMÈLIS** L. WITCH-HAZEL. Deciduous shrubs or small trees with stellate pubescence; buds naked, stalked: lvs. short-petioled, oblique at base, sinuate-dentate, with caducous, rather large stipules: fls. perfect, in short-peduncled axillary few-fld. clusters; calyx 4-parted, with spreading ovate obtuse lobes, tomentose outside; petals 4, linear, crumpled in bud, yellow; stamens 4 with short filaments, alternating with scale-like staminodes; styles distinct, short: caps. 2-valved with the calyx-limb about or below the middle; seeds 2, black lustrous, oblong. (Ancient Greek name of a pear-shaped fr., probably the medlar.) Six species in N. Am. and E. Asia.—Ornamental shrubs interesting on account of the unusual time of flowering, from late autumn to early spring.

A. Lvs. soon glabrous or glabrate, rarely pubescent below, subcordate to truncate.
  B. Fls. in autumn; lvs. bright green beneath ..... 1. *H. virginiana*
  BB. Fls. during the winter or in early spring.
    C. Lvs. generally obovate with about 5 pairs of veins, often glaucescent beneath and sometimes tomentulose: petals 1–1.5 cm. long ..... 2. *H. vernalis*
    CC. Lvs. generally broad-ovate, with about 7 pairs of veins: petals about 2 cm. long. 3. *H. japonica*
AA. Lvs. densely soft-pubescent, cordate at base ..... 4. *H. mollis*

1. **H. virginiàna** L. Shrub or small tree to 5 m.; lvs. obovate or elliptic, obtusely short-acuminate or obtusish, narrowed toward the base and subcordate, rarely broad-cuneate, 8–15 cm. long, coarsely crenate-dentate, nearly glabrous or pubescent on the veins beneath, with 5–7 pairs of veins; petioles 5–15 mm. long, pubescent: petals bright yellow, 1.5–2 cm. long; sepals dull brownish yellow inside: fr. broad-obovoid, 1.2–1.4 cm. long, with the calyx-limb slightly below the middle. Fl.IX–X; fr. the following autumn. Em.

t472(c). B.M.6684(c). S.S.5:t.198. Gn.33:589;39:547;78:45. Can. to Ga., w. to Neb. and Ark. Intr. 1736. Zone IV or III.—Var. **rubéscens** Rehd. Petals reddish; sepals yellowish or brownish green inside.—Spreading shrub with rather large lvs. turning bright yellow in autumn and opening its fls. exhaling a heavy odor when the lvs. are falling.

A closely related species is **H. macrophýlla** Pursh. Lvs. smaller, with fewer, shallower and more rounded lobes, less unsymmetrical at base, more or less pubescent and roughened by persistent tubercles: sepals yellow inside. Fl.xii–ii. S.M. 370. Ga. to Fla., Ark. and Tex. Zone VIII? Intr. ?

2. **H. vernalis** Sarg. Upright shrub to 2 m. or rarely more, suckering; lvs. obovate to oblong-obovate, obtusely pointed, narrowed toward the broad-cuneate or truncate, rarely subcordate base, 6–12 cm. long, coarsely sinuate-dentate above the middle, green or glaucescent beneath, glabrous or nearly so, with 4–6 pairs of veins; petioles 5–12 mm. long, pubescent: fls. fragrant; petals 1–1.5 cm. long, light yellow, often reddish toward the base; sepals dark red inside: fr. like that of the preceding species. Fl.i–iii; fr.ix–x. B.M. 8573(c). Add.8:t.261(c). S.T.2:t.156. R.H.1913:131. Mo. to La. and Okl. Intr. 1908. Zone V.—Var. **tomentélla** Rehd. Lvs. glaucescent and more or less densely pubescent or tomentulose beneath: petals yellow or reddish.—The fls. are less showy than those of the following winter-blooming species, but they exhale a sweet fragrance.

3. **H. japónica** Sieb. & Zucc. Shrub or small tree to 10 m., with spreading brs.: lvs. suborbicular to broad-ovate or elliptic, rarely obovate, acute or rounded at apex, rounded or subcordate, rarely broad-cuneate at base, 5–10 cm. long, light green and glabrous or slightly pubescent beneath; with usually 6–7 pairs of veins; petioles 5–15 cm. long, slightly pubescent: petals about 2 cm. long, bright yellow, sepals usually purple inside, with revolute lobes: caps. with the calyx-limb much below the middle. Fl.i–iii; fr.ix–x. S.I.2:t.25(c). Gt.49:t.1481(c). G.F.4:257. B.C.3:1431. Gn.87:661. Japan. Intr. 1862. Zone V.—Var. **arbórea** Gumbleton. Of tree-like habit, more vigorous: lvs. somewhat larger and of firmer texture; calyx deep purple inside, stamens purple; petals golden-yellow. B.M.6659(c). R.H.1891:472,t.(c). G.C.II.1:187;III.9:247. Gn.39:546,t(c);87:660. (*H. a.* Ottolander.) Intr. 1862.—Var. **Zuccariniàna** Gumbleton. Tree-like, but brs. more upright; petals pale yellow and the calyx greenish yellow inside. (*H. Z.* Ottolander.) Gn.17:251. R.B.28:62,t. Cult. 1882.—Var. **flavo-purpuráscens** Rehd. Petals red or reddish, at least toward the base; sepals deep purple inside. (*H. obtusata* var. *f.* Mak., *H. incarnata* Mak.) Japan. Intr. 1919.—A very conspicuous object when blooming in winter; the delicate petals withstand zero weather without injury.

4. **H. móllis** Oliv. Shrub or small tree to 10 m.; young brts. densely tomentose: lvs. orbicular-obovate to obovate, short-acuminate, obliquely cordate to subcordate at base, 8–16 cm. long, sinuately denticulate, pubescent above, grayish tomentose beneath; petioles stout, 5–10 mm. long, densely pubescent; calyx ferrugineously tomentose outside, purplish red inside; petals golden yellow, reddish at the base, 1.5–2 cm. long: caps. enclosed ⅓ by the calyx. Fl.i–iii; fr.x. B.M.7884(c). Add.7:t.229(c). G.C.III.52:488. H.I.1742. Gn.80:62(h);87:661;90:3(h),94. C. China. Intr. 1879. Zone V.—The handsomest of all the Witch-Hazels.

The related Japanese **H. bitchuiénsis** Mak. with the lvs. densely pubescent and glaucous beneath is not yet in cult.

The evergreen **Loropétalum chinense** Oliv. (B.M.7979) with white fls. similar in shape to those of Hamamelis and with small entire lvs. is probably not hardy within our area.

38. **EUCOMMIACEAE** Van Tiegh. EUCOMMIA FAMILY

Deciduous trees: brs. with lamellate pith; buds ovoid, pointed, with about 6 exposed scales: lvs. alternate, petioled, serrate, estipulate: fls. dioecious, without perianth, in the axils of bracts at the base of the young brts., before or with the lvs.; staminate fls. pediceled, with 4–10 linear mucronate anthers on very short filaments; pistillate fls. short-pediceled consisting of a 1-celled ovary composed of 2 carpels with one locule aborted, bifid at apex with the lobes stigmatic on the inner side: fr. a stipitate, oblong, compressed and winged 1-seeded nutlet; seed albuminous with a straight embryo as long as the albumen; cotyledons narrow, flat.—Contains only the following monotypic genus.

EUCÓMMIA Oliv. Characters of the family. (Greek *eu*, well, and *kommi*, gum; referring to the fact that the plant contains rubber.)

E. ulmoìdes Oliv. Tree to 20 m.; brts. glabrous, light or yellowish brown, lenticellate: lvs. elliptic or ovate to oblong-ovate, acuminate, broad-cuneate or rounded, 7–8 cm. long, serrate, glabrous above and slightly rugose at maturity, pubescent beneath chiefly on the veins while young; petioles 1.5–2.5 long, anthers about 1 cm. long, brownish red: fr. oblong, 3–4 cm. long. Fl. IV; fr. IX–X. H.I.1950,2361. Kew Bull. 1904:4,t. R.H.1909:226, 227 (h). M.G.27:11, 613(h);32:249(h). C. China. Intr. 1896. Zone V.—Small tree with upright and ascending brs. somewhat resembling an elm-tree; of no particular ornamental merit, but interesting as the only rubber-producing tree hardy so far north, though the rubber is not present in sufficient quantity and too difficult to extract to make commercial exploitation pay.

39. **PLATANACEAE** Lindl. PLANE-TREE FAMILY

Deciduous trees with stellate pubescence; bark pale, exfoliating in broad thin plates; buds ovoid, acutish, with a single closed scale, at first hidden by the base of the petiole, the terminal one lacking: lvs. alternate, long-petioled, large, palmately veined and lobed; stipules usually sheathy with spreading margin; fls. monoecious, in dense globose heads; staminate and pistillate similar, but on separate peduncles; sepals 3–8, triangular, pubescent, petals as many, spatulate; staminate fls. with 3–8 stamens with very short filaments, connective enlarged at apex into a peltate scale; pistillate with 3–8 distinct carpels with elongated styles stigmatic on the inner side; ovary oblong, with 1 or 2 pendulous ovules: fr. a syncarp consisting of numerous narrowly obconical angled 1-seeded nutlets surrounded by long hairs; seed with scant albumen; embryo slender, with linear often unequal cotyledons.—One genus with 6–7 species in N. Am. s. to Mex. and from S. E. Eu. to India.

PLÁTANUS L. PLANE-TREE. Characters of the family. (Ancient Greek name, probably from *platys*, broad.)—The Plane-trees are ornamental trees with handsome large lvs., much planted as shade and street trees, particularly in cities, as they do not suffer much from dust and smoke and stand even severe pruning well.

A. Fr.-heads racemose 3 or more, bristly: lvs. usually deeply lobed.....1. *P. orientalis*
AA. Fr.-heads 1 or 2, rarely 3 or more.
B. Fr. heads 2 or occasionally more: lvs. with the middle lobe about as long as broad. 2. *P. acerifolia*
BB. Fr.-heads usually solitary: lvs. with the lobes broader than long.....3. *P. occidentalis*

1. P. orientàlis L. ORIENTAL P. Tree to 30 m., with usually broad round head and comparatively short and thick trunk; bark exfoliating in

large flakes, dull grayish or greenish white: lvs. broad-cuneate or truncate at base, 10–20 cm. wide, deeply 5–7-lobed, the sinuses reaching to or below the middle of the leaf, lobes longer than broad, coarsely toothed or entire, glabrous or nearly so at maturity; petioles 3–8 cm. long: fr.-heads 2–6, on long pendulous stalks, 2–2.5 cm. thick, bristly and with exserted hairs between the nutlets, their apex conical, with persistent style. Fl.v; fr.IX–X. S.O.3:t.128(c). N.D.1:t.1(c). Gn.20:369. G.C.III.23:25,27(h). G.F.4:91(h). G.W.14:688, 689(h). M.D.1915:3,t(h). H.E.3,t.174–176(h). (*P. vulgaris* Spach.—Sycamore.) S. E. Eu. and W. Asia. Cult. since ancient times. Zone VI or VII.—Var. **digitàta** Janko. Lvs. cuneate to truncate, deeply 5-lobed, with wide sinuses and narrow elongated coarsely dentate or lobulate lobes. Gn.20:371. G.C.III.76:250. (*P. digitata* Gord., *P. o. laciniata* Hort., *P. nepalensis* Hort.) Intr. about 1842.—Var. **cuneàta** Loud. Smaller tree, sometimes shrubby: lvs. short-petioled, cuneate or sometimes truncate, 3- or sometimes 5-lobed with ascending toothed lobes. G.C.III.29:363. Gn.20: 371. (*P. c.* Willd.) This and the preceding var. are according to A. Henry possibly of hybrid origin.—Tree with broad round head and short trunk often divided near the base into several stems, planted as a shade tree since ancient times in W. Asia and S. E. Eu.

The two following species have the fr. also in pendulous racemes, but the lvs. tomentose beneath. **P. racemòsa** Nutt. Tree to 40 m.: lvs. deeply 3–5-lobed with narrow, entire or remotely dentate lobes: fr.-heads 2–7, sessile, bristly; achenes with conical or rounded apex. S.S.7:t.328. (*P. californica* Benth.) S. Calif. and L. Calif. Cult. 1870. Zone VIII?—**P. Wrightii** Wats. Tree to 25 m.: lvs. deeply 3–5-lobed, tomentose, finally often nearly glabrous beneath, with lanceolate, entire or remotely dentate lobes: fr.-heads 2–4, usually stalked, mostly smooth, the achenes truncate or rounded with a more or less deciduous style. S.S.7:t.329. Ariz. and N. Mex. to n. Mex. Cult. 1900. Zone VI?

2. **P. acerifòlia** Willd. London P. (*P. occidentalis* × *orientalis.*) Tree to 35 m., with tall upright stem and widespreading brs., the lower ones drooping; bark exfoliating in large flakes; young growth densely brownish tomentose; lvs. truncate to cordate, 12–25 cm. wide, 3–5-lobed, with triangular-ovate or broad-triangular not or sparingly toothed lobes, with acute or rounded sinuses extending to about ⅓ the length of the blade, glabrous or nearly so at maturity; petiole 3–10 cm. long: fr.-heads usually 2, rarely 1 or 3, about 2.5 cm. across, bristly; nutlet ovoid or rounded at apex and crowned by the persistent remnant of the style. G.C.III.66:48. E.H.3:t.204,f.1. Proc. Irish Acad. 35B:t.6. F.E.24:69(h). (*P. orientalis* var. *a.* Ait., *P. intermedia* Hort., *P. damascena* Dode, *P. densicoma* Dode, partly.) Origin unknown, probably before 1700. Zone (V), VI.—Var. **Kelseyàna** Schneid. Lvs. variegated with yellow. (Var. *aùreo-variegàta* Hort.)—Var. **Súttneri** Schneid. Lvs. blotched with creamy white. (*P. occidentalis argenteo-variegata* Hort.)—Var. **pyramidàlis** Schneid. Habit more upright, lower brs. not drooping: lvs. usually 3-lobed with slightly toothed lobes, often longer than broad, usually rounded at base. G.C.III.66:51.—Var. **hispànica** Bean. Lvs. usually 5-lobed with toothed lobes, often to 30 cm. wide, truncate to subcordate. G.C.III.66:50.—Here belongs also *P. cantabrigiensis* Henry. Lvs. rather small, 5-lobed, truncate with cuneate centre: fr.-balls usually 3, similar to those of *P. orientalis.* G.C.III.76:251.—The London Plane-tree is much planted as a street tree in Eu. and in this country: it is a tall tree with a straight trunk and a broad round head. Like the other species it is conspicuous in winter on account of the large fruit-balls hanging from the brs. and of the light colored smooth bark mottled by darker blotches of old bark.

3. **P. occidentàlis** L. Buttonwood. Tree to 40 or occasionally to 50 m.,

with tall trunk and round or ovoid head; bark almost creamy white, exfoliating in rather small plates, dark brown and fissured at the base of older trunks: lvs. truncate or cordate, rarely cuneate, 10–22 cm. wide, often broader than long, 3- or sometimes 5-lobed with shallow sinuses and broad-triangular lobes, broader than long, coarsely toothed or rarely entire, floccose-tomentulose when young, at maturity pubescent only along the veins beneath: fr.-heads solitary, rarely 2, about 3 cm. across, rather smooth at maturity; nutlets with truncate or obtuse apex with a short style, without exserted hairs between the nutlets. Fl.v; fr.ix–x. S.S.7:t.326, 327. Em.1:261, 263,t. G.F.2:354, 355(h);9:55(h). F.L.19:9,t(h). Am. For. 28:145(h). (Buttonball, American Plane.) Maine to Ont. and Minn., s. to Fla. and Tex. Intr. 1636. Zone IV.—Var. **glabràta** Sarg. Lvs. usually smaller and of firmer texture, mostly truncate at base, more deeply lobed, the sinuses extending to about ⅓ of the blade, the lobes long-acuminate and often entire, or coarsely and sparingly dentate. (*P. g.* Fern., *P. densicoma* Dode, partly.) Iowa to Tex. and n. Mex. Intr.?—The most massive and perhaps the tallest deciduous tree of N. Am., often planted as a shade and avenue tree, but not thriving well in Eu. and little planted there.

40. ROSACEAE Juss. ROSE FAMILY.

Herbs, shrubs or trees, deciduous or evergreen, often thorny; buds usually with several exposed scales, sometimes with 2: lvs. alternate, rarely opposite; stipules usually conspicuous, rarely wanting: fls. perfect, rarely unisexual, usually regular, perigynous, the axis enlarged into a flat to urceolate or sometimes conical receptacle bearing the sepals, petals and stamens on its margin, inside usually lined with a glandular disk; sepals 4–5, imbricate; petals as many, imbricate, sometimes wanting; stamens 5–many; carpels 1–many, distinct or more or less united and often connate with the receptacle; carpels with 1–several upright or pendulous ovules; styles as many as carpels, sometimes connate: fr. a follicle, achene, drupe, hip or pome; seeds usually exalbuminous; cotyledons often fleshy with convex back, rarely folded or convolute.—About 100 genera with more than 2000 species widely distributed in all parts of the world, most abundant in the temperate regions.

Several families, as Spiraeaceae, Pomaceae (Malaceae) and Amygdalaceae (Prunaceae), chiefly distinguished by fruit characters, have been segregated, but they are all closely linked together by their floral characters and are perhaps best considered tribes or subfamilies of Rosaceae.

KEY TO THE SUB-FAMILIES

A. Fr. consisting of 1–5, rarely to 12 dehiscent follicles, indehiscent only in No. 12, or fr. a dehiscent caps.: stipules present or wanting ..... 1. *Spiraeoideae*

AA. Fr. indehiscent: lvs. stipulate.

B. Ovary inferior; the 2–5 carpels more or less connate and adnate to the cup-shaped receptacle: fr. a pome, sometimes berry-like ..... II. *Pomoideae*

BB. Ovary superior (apparently inferior in Rosa).

C. Carpels usually many (if 1 or 2, not drupaceous); calyx persistent: lvs. often compound ..... III. *Rosoideae*

CC. Carpel usually 1, rarely 2 or 5, drupaceous; calyx usually deciduous: lvs. always simple ..... IV. *Prunoideae*

I. SPIRAEOIDEAE

A. Fr. follicular, dehiscent; seeds not winged: fls. not exceeding 2 cm. in width.

B. Lvs. simple, entire to lobed, or trifid in No. 8: pistils opposite to the petals or less than 5.

C. Stipules present, caducous; lvs. lobed: staminal disk wanting; seeds shining.

D. Follicles dehiscent along both sutures, often inflated, 1–5: fls. in umbel-like racemes ..... 1. *Physocarpus*

DD. Follicles dehiscent only along the ventral suture, not inflated, 1–2: lvs. with acuminate lobes.

EE. Fls. in terminal elongated racemes or panicles; follicles usually 5-seeded. 2. *Neillia*
EE. Fr. in small terminal corymbs, minute; style lateral; follicle 1, 1–2-seeded. 3. *Stephanandra*
CC. Stipules wanting: carpels usually 5.
D. Lvs. entire or lobed: stamens free.
E. Fls. in panicles, corymbs or umbel-like racemes.
F. Carpels free: lvs. usually serrate or lobed (see also No. 12).
G. Petals orbicular to obovate; ovules 2–many. 4. *Spiraea*
GG. Petals linear; ovules 2. 5. *Pentactina*
FF. Carpels connate at base: fls. polygamo-dioecious, in panicled racemes: lvs. entire. 6. *Sibiraea*
EE. Fls. in racemes; carpels dehiscent on both sutures: lvs. entire: prostrate subshrub. 7. *Petrophytum*
DD. Lvs. trifid with narrow segments: fls. in racemes; stamens connate at base: prostrate subshrub. 8. *Luetkea*
BB. Lvs. pinnate or bipinnate, stipulate: fls. in panicles, white; carpels connate at base.
C. Lvs. pinnate; lfts. serrate. 9. *Sorbaria*
CC. Lvs. bipinnate; lfts. entire, very small. 10. *Chamaebatiaria*
AA. Fr. capsular, dehiscent or of 5 indehiscent achenes: lvs. simple; stipules wanting.
B. Fls. about 4 cm. across, in racemes: fr. capsular. 11. *Exochorda*
BB. Fls. small, in panicles: fr. of 5 achenes. 12. *Holodiscus*

II. Pomoideae

A. Carpels bony at maturity; fr. with 1–5 stones.
B. Lvs. entire or lobed.
C. Lvs. entire or rarely serrulate: brs. unarmed.
D. Fls. usually in several-to many-fld. corymbs, not more than 1 cm. across: fr. about 1 cm. across or less: pistils 2–5. 13. *Cotoneaster*
DD. Fls. solitary, 3–5 cm. across: fr. 3–5 cm. across, brown with foliaceous calyx-lobes: pistils 5. 15. *Mespilus*
CC. Lvs. crenate, dentate or lobed, rarely entire: brs. usually spiny.
D. Lvs. persistent, crenate or entire: pistils 5, with 2 fertile ovules. 14. *Pyracantha*
DD. Lvs. deciduous, rarely subpersistent: pistils 1–5, with 1 sterile and 1 fertile ovule. 16. *Crataegus*
BB. Lvs. pinnate; lfts. small, entire. 17. *Osteomeles*
AA. Carpels with leathery or papery walls at maturity: fr. a 1–5-celled pome, each cell with 1 or more seeds.
B. Fls. in compound corymbs or panicles.
C. Carpels partly free; styles 2–5, distinct or connate: fls. in corymbs or broad corymbose panicles.
D. Ovary in fr. free only at apex or ¼ of its length; endocarp not dehiscent; styles 2–5.
E. Pedicels and infl. not verrucose: lvs. deciduous.
F. Styles 2–5: lvs. pinnate or simple and often lobed, usually with excurrent veins: calyx-lobes sometimes deciduous. 18. *Sorbus*
FF. Styles 5, connate below: lvs. simple, with curving veins, glandular-denticulate, glandular on midrib above: calyx-lobes persistent. 19. *Aronia*
EE. Pedicels and infl. verrucose, or smooth and lvs. persistent: lvs. simple, serrulate. 20. *Photinia*
DD. Ovary in fr. (core) free to the middle and endocarp at full maturity dehiscent: lvs. persistent, entire or serrulate. 21. *Stranvaesia*
CC. Carpels wholly connate; styles 5, distinct: fls. in panicles: fr. pear-shaped, yellow, 3–4 cm. long: lvs. evergreen, with excurrent veins. 22. *Eriobotrya*
BB. Fls. in umbels, racemes or solitary.
C. Carpels 4–many-seeded.
D. Styles connate at base: lvs. serrate or crenate, rarely entire.
E. Ovules 4–10 in each cell; calyx tomentose outside. 27. *Docynia*
EE. Ovules many in each cell; calyx glabrous outside. 28. *Chaenomeles*
DD. Styles free: lvs. entire. 29. *Cydonia*
CC. Carpels 1–2-seeded.
D. Ovary and fr. 2–5-celled; cells 2-ovuled.
E. Lvs. evergreen: ovary 2-celled; fls. in upright racemes, sometimes panicled: fr. black. 23. *Rhaphiolepis*
EE. Lvs. deciduous: ovary 2–5-celled; fls. in umbel-like racemes.
F. Styles connate at base: fr. usually apple-shaped, without or with few grit-cells. 26. *Malus*
FF. Styles free: fr. usually pear-shaped, its flesh with numerous grit-cells. 30. *Pyrus*
DD. Ovary and fr. incompletely 6–10-celled; cells 1-ovuled.
E. Fls. usually in racemes; styles usually 5: lvs. serrate or crenate. 24. *Amelanchier*
EE. Fls. in few-fld. umbels; styles 2–3: lvs. entire or denticulate, narrow. 25. *Peraphyllum*

III. Rosoideae

A. Pistils borne on a flat or convex receptacle, usually many.
B. Pistils 2–5: lvs. simple.
C. Petals wanting; fls. in few-fld. corymbs. 31. *Neviusa*
CC. Petals present; fls. solitary.

D. Lvs. alternate: fls. 5-merous, yellow....32. *Kerria*
DD. Lvs. opposite: fls. 4-merous, white....33. *Rhodotypus*
BB. Pistils many.
C. Carpels becoming drupelets: brs. often prickly....34. *Rubus*
CC. Carpels becoming dry achenes: brs. never prickly.
D. Lvs. pinnate or pinnatifid.
E. Style deciduous: fls. yellow or white: lvs. pinnate....35. *Potentilla*
EE. Style persistent, plumose: fls. white: lvs. pinnatifid.
F. Calyx with bracts at base; pistils many: lvs. glandular....36. *Fallugia*
FF. Calyx without bracts; pistils few: lvs. glandless....37. *Cowania*
DD. Lvs. undivided, serrate, persistent: fls. 8–9-merous: prostrate subshrub ..38. *Dryas*
AA. Pistils enclosed in a tubular or urn-shaped receptacle.
B. Pistils 1–4.
C. Receptacle tubular or campanulate, enclosing the achene loosely or partly; pistil usually 1.
D. Fls. apetalous: lvs. simple, dentate or entire....39. *Cercocarpus*
DD. Fls. with petals.
E. Lvs. 3-fid at apex: fls. small, yellow....40. *Purshia*
EE. Lvs. bipinnate: fls. white....41. *Chamaebatia*
CC. Receptacle urceolate, completely enclosing the 1–4 achenes: lvs. pinnate, small.
D. Receptacle with prickles, at least 1 under each sepal: fr. white (covered with spines in Acaena)....42. *Margyricarpus*
DD. Receptacle without prickles: fr. red: fls. unisexual....43. *Poterium*
BB. Pistils many: achenes enclosed in the fleshy receptacle: fls. usually large: lvs. pinnate, rarely simple: brs. usually prickly....44. *Rosa*

IV. Prunoideae

A. Carpels 1, rarely 2: lvs. usually serrate.
B. Sepals many; petals wanting or small....45. *Maddenia*
BB. Sepals 5; petals present.
C. Style terminal: pith of brs. solid....46. *Prunus*
CC. Style lateral: pith of brs. lamellate....48. *Prinsepia*
AA. Carpels 5: lvs. entire....47. *Osmaronia*

Subfam. I. Spiraeoideae Focke. Unarmed shrubs, rarely trees or herbs: lvs. simple or compound, with or without stipules: fls. usually small, white to pink or purple, in usually large infl.; carpels usually 5, rarely more or less, free or connate, superior, developing into dehiscent follicles usually with several seeds, or rarely into achenes. (*Spiraeaceae* Maxim.)

1. **PHYSOCÁRPUS** Maxim. Ninebark. Deciduous shrubs; bark peeling off in thin strips; buds rather small, with about 5 exposed brown scales: lvs. alternate, petioled, serrate and usually 3-lobed and 3-nerved at base: fls. perfect, in terminal umbel-like racemes; receptacle cup-shaped; sepals 5, valvate; petals spreading, suborbicular, little longer than sepals, white or rarely pinkish; stamens 20–40; pistils 1–5, united at base: follicles usually inflated, dehiscent along both sutures; seeds 2–5, yellowish, shining. (Greek *physa*, bladder, and *karpos*, fruit; referring to the inflated fruit.) Syn. *Opulaster* Raf.—Thirteen species in N. Am. and one in N. E. Asia.—Ornamental shrubs of usually spreading habit with bright green foliage and with conspicuous though not very showy white fls. in dense umbels in June; in some species the inflated pods assume a bright red color in late summer.

A. Carpels 4–5, rarely 3.
B. Pods glabrous, usually 5....1. *P. opulifolius*
BB. Pods pubescent.
C. Pods usually 5....2. *P. amurensis*
CC. Pods usually 3 or 4....3. *P. intermedius*
AA. Carpels usually 2, united half their length.
B. Mature carpels turgid, styles spreading....4. *P. monogynus*
BB. Mature carpels flattened; styles erect....5. *P. malvaceus*

1. **P. opulifòlius** Maxim. Shrub to 3 m.; brts. glabrous or nearly so: lvs. roundish-ovate, 2–7 cm. long, usually 5-lobed, with crenate-dentate obtuse or acutish lobes, glabrous or nearly so beneath, those of the shoots to 10 cm. long, more deeply lobed and usually acute to acuminate: fls. white or pinkish, about 1 cm. across, in many-fld. corymbs 3–5 cm. broad; pedicels and calyx glabrous or sparingly pubescent; stamens purplish; pods usually 5, glabrous, twice as long as sepals, acuminate. Fl.VI–VII; fr.IX–X. N.D.1:t.

14(c). R.I.24:t.153(c). B.B.2:244. B.C.5:2610. (*Spiraea opulifolia* L., *Neillia o.* Brew. & Wats., *Opulaster o.* Ktze.) Que. to Va., Tenn. and Mich.; occasionally escaped from cult. Intr. 1687. Zone IV.—Var. **lùteus** Zabel. Lvs. bright yellow at first, changing to bronzy yellow. (*Spiraea o. lutea* Kirchn.) Orig. before 1864.—Var. **nānus** Zabel. Dwarf form with smaller less deeply lobed and dark green lvs. (*Spiraea o. nana* Kirchn.) Orig. before 1864.

A closely related species is **P. capitàtus** Ktze. Shrub with often sarmentose brs.: lvs. 3–5-lobed, usually stellate-pubescent beneath; pedicels and calyx densely stellate-tomentose; fls. about 1.4 cm. across: pods glabrous at maturity. (*Spiraea capitata* Pursh, *S. o.* var. *mollis* Torr. & Gray, *Opulaster c.* Ktze.) B. C. to Idaho and n. Calif. Intr. 1827. Zone V.

2. **P. amurénsis** Maxim. Shrub to 3 m.; brts. glabrous or slightly pubescent: lvs. ovate, subcordate to truncate, 5–10 cm. long, 3–5-lobed, with acute or acuminate doubly serrate lobes, stellate-pubescent: fls. about 1.5 cm. across, in rather loose umbels; pedicels and calyx densely stellate-tomentose; stamens purple: pods usually 3–4, stellate-pubescent, about ⅓ longer than the calyx-lobes. Gt.14:t.489. N.K.4:t.15. (*Spiraea a.* Maxim., *Opulaster a.* Ktze.) Manch., Korea. Intr. between 1854 and 1860. Zone IV.—Similar to *P. opulifolius*, but lvs. and flowers larger.

3. **P. intermèdius** Schneid. Shrub to 1.5 m.; brts. glabrous or nearly so: lvs. suborbicular to ovate, usually rounded to broad-cuneate, 2–6 cm. long, usually shallowly 3-lobed, with obtuse doubly crenate lobes, sparingly stellate or nearly glabrous beneath: fls. about 1.2 cm. across in rather dense umbels; pedicels and calyx stellate-pubescent or nearly glabrous: pods stellate-pubescent, inflated, nearly twice as long as sepals. B.B.2:244. (*P. Ramaleyi* A. Nels., *P. missouriensis* Daniels, *Opulaster i.* Rydb.) S. Ont. and w. N. Y. to Ill., Mo., Ark., Colo. and S. Dak. Intr. 1908. Zone IV.—Var. **parvifòlius** Rehd. Dense form, with upright crowded brts.: lvs. ovate, acute, rounded to broad-cuneate at base, 1.5–2 cm. long, glabrous: fls. smaller; pedicels and calyx glabrous; bracts oblong, more or less persistent: pods usually 3, pubescent. Orig. before 1918.

A closely related species is **P. stellàtus** Rehd. Brts. stellate-pubescent: lvs. stellate-pubescent beneath, often acute or acuminate on the shoots: umbels rather small and loose; pedicels and calyx densely stellate-pubescent: pods usually 4, abruptly acute. (*P. ferrugineus* Daniels, *Opulaster s.* Rydb., *O. alabamensis* Rydb.) S. C. to Ala. and Ga. Intr. 1906. Zone V.

4. **P. monógynus** Coult. Shrub to 1 m.; brts. glabrous or sparingly stellate: lvs. broad-ovate to reniform, rounded or subcordate, 1.5–3.5 cm. long, incisely 3–5-lobed, with rounded, incisely serrate lobes, glabrous or nearly so: fls. 1 cm. across, often pinkish, in rather few-fld. umbels; pedicels and calyx sparingly or rather densely stellate-pubescent; pods 2, rarely 3 or 1, united to about the middle, densely stellate-pubescent, with spreading beaks. G.F. 2:5. B.C.5:2611. (*P. Torreyi* S. Wats., *Spiraea monogyna* Torr., *Neillia Torreyi* Wats.) S. Dak. and Wyo. to Tex. and N. Mex. Intr. 1879. Zone V.—A neat small shrub with small lvs. somewhat resembling those of *Ribes alpinum;* smaller than *P. opulifolius* in every part.

Closely related species are: **P. glabràtus** Rehd. which differs chiefly in the glabrous or nearly glabrous pedicels and calyx, somewhat larger fls. and less deeply lobed lvs. with doubly crenate lobes. (*Opulaster g.* Rydb.) Colo. Cult. 1908. Zone V. A more showy shrub than the preceding, with larger fls.—**P. bracteatus** Rehd. It differs chiefly in the many-fld. infl. with obovate or spatulate, often foliaceous and persistent bracts and in the larger lvs. 2–7 cm. long, broad-ovate, usually 3-lobed with doubly crenate lobes: fls. somewhat larger; pedicels and calyx densely stellate-tomentose. (*Opulaster b.* Rydb., *O. Ramaleyi* A. Nels., in part.) Colo. Cult. 1909. Zone V.—Showier than *P. monogynus.*

5. **P. malvàceus** Ktze. Shrub to 2 m.; brts. stellate-pubescent: lvs. orbicular to broad-ovate, cordate to truncate, 2–6 cm. long and about as broad, 3–5-lobed with broad rounded doubly crenate-dentate lobes, glabrous or stellate-pubescent above, stellate-pubescent beneath; rarely nearly glabrous: fls. white, about 1 cm. across, in rather few-fld. umbels with cuneate or spatulate caducous bracts; pedicels and calyx densely stellate-pubescent: pods usually 2, stellate-pubescent, flattened and somewhat keeled, dehiscent after falling, about as long as the sepals, with erect beaks. B.M.7758(c, as *Neillia Torreyi*). (*P. pauciflorus* Piper, *Opulaster m.* Ktze., *Neillia malvacea* Greene.) B. C. to Mont., Wyo., Utah and Ore. Intr. 1896. Zone V.—An upright shrub differing from *P. opulifolius* in the lower and more upright habit and in the smaller lvs. and smaller umbels.

2. **NEÌLLIA** D. Don. Deciduous shrubs, with slender brs.; buds ovoid, acutish, often superposed, with about 4 exposed scales: lvs. alternate, 2-ranked, doubly serrate and usually lobed, with conspicuous deciduous stipules: fls. perfect, in terminal racemes or panicles, with caducous bracts; calyx-tube campanulate to tubular; sepals 5, erect, short, about as long as the suborbicular to oval petals; stamens 10–30, in 1–3 series; carpels 1–2, with slender terminal styles; ovules 5–10 in each carpel; pods enclosed by the persistent calyx-tube, dehiscent along the inner suture; seeds several, lustrous. (After Patrick Neill of Edinburgh, Scotch botanist; 1776–1851.) About 10 species in China and in the Himal.—Ornamental graceful shrubs with spreading, slender usually zigzag brs., bright green generally ovate lvs. and white or pink fls. in terminal racemes.

A. Racemes forming terminal panicles: fls. whitish; calyx-tube campanulate. 1. *N. thyrsiflora*
AA. Racemes solitary; fls. usually pink.
B. Calyx-tube campanulate; petioles often 2 cm. long. 2. *N. affinis*
BB. Calyx-tube cylindric, longer than the sepals: petioles not exceeding 1.5 cm.
C. Pedicels short; calyx-tube pubescent. 3. *N. thibetica*
CC. Pedicels slender, about 5 mm. long; calyx-tube glabrous. 4. *N. sinensis*

1. **N. thyrsiflòra** D. Don. Upright shrub to 1 or rarely 2 m.; young brts. angular, glabrous: lvs. ovate to ovate-oblong, long-acuminate, cordate, 4–10 cm. long, doubly incised-serrate, 3-lobed, particularly on the shoots, pubescent on the veins beneath or nearly glabrous; petioles 5–10 mm. long: fls. white, short-stalked, in racemes 3–7 cm. long, forming terminal panicles; calyx-tube campanulate, with the lanceolate sepals about 8 mm. long, usually sparingly stipitate-glandular; ovary glabrous except a few hairs on the sutures. Fl.VIII–IX. R.H.1888:416. L.I.,t.ined. Himal. Intr. about 1850. Zone (VI), VII?—An upright shrub with rather insignificant fls.; tender, but if killed to the ground the young shoots flower and fruit the same season.

2. **N. affinis** Hemsl. Shrub to 2 m.; brts. angled, glabrous: lvs. ovate to ovate-oblong, long-acuminate, cordate or subcordate, 5–9 cm. long, lobulate and often with a pair of acuminate lobes at base, slightly pubescent on the veins beneath or nearly glabrous; petioles 1–2.5 cm. long: fls. pink, in dense racemes 3–8 cm. long; pedicels 2–5 mm. long; calyx-tube campanulate, finely pubescent and usually sparingly stipitate-glandular, about as long as the lanceolate sepals; ovary villous. Fl.V–VI. W. China. Intr. 1908. Zone V?

A related species is **N. Uékii** Nakai. Lvs. ovate, 4–8 cm. long, pubescent on the veins beneath; racemes 3–5 cm. long; fls. white, campanulate, about 6 mm. long; calyx-tube stipitate-glandular, otherwise glabrous, at maturity densely glandular-bristly. N.K.4:t.13. Korea. Intr. 1906. Zone V.

3. **N. thibética** Franch. Shrub to 2 m.; young brts. nearly terete, pubescent: lvs. ovate, subcordate, long-acuminate, 5–8 cm. long, doubly serrate

and lobulate, sparingly pubescent above when young, pubescent beneath, densely so on the veins and veinlets; petioles 8–15 mm. long; stipules ovate, serrate, much shorter than petioles: fls. short-stalked, about 8 mm. long, in rather dense racemes 4–8 cm. long; calyx-tube cylindric, finely pubescent, twice as long as the sepals, at maturity glandular-bristly; ovary silky-pubescent. W. China. Intr. 1910. Zone V?

A closely related species is **N. longeracemòsa** Hemsl. which differs chiefly in the less densely pubescent or glabrescent under side of the lvs., in the lanceolate entire stipules, usually as long as the petioles, and in the ovary being hairy only at the apex. W. China. Intr. 1909. Zone V or VI?

4. **N. sinénsis** Oliv. Shrub to 2 m.; young brts. terete, glabrous: lvs. ovate to ovate-oblong, long-acuminate, rounded or truncate, 4–8 cm. long, incisely serrate and lobulate, sparingly hairy or nearly glabrous; petioles 5–15 mm. long, glabrous; stipules usually lanceolate, entire: fls. pinkish, 1–1.2 cm. long, nodding, in slender racemes 3–6 cm. long; pedicels 3–7 mm. long; calyx-tube cylindric, glabrous, sometimes with glandular bristles; sepals triangular-ovate, long-acuminate, much shorter than the tube; ovary hairy at apex. Fl.v–vi; fr.viii–ix. H.I.16:1540. B.C.4:2116. B.S.2:95. M.O.175. C. China. Intr. 1901. Zone V.—A graceful shrub with slender spreading brs. bearing numerous racemes of nodding pinkish fls.; lvs. bright green.

3. **STEPHANÁNDRA** Sieb. & Zucc. Deciduous shrubs, with slender brs.; buds superposed, small, with about 4 exposed scales: lvs. alternate, 2-ranked, serrate and usually lobed, stipulate: fls. perfect, white, small, slender-stalked, in terminal corymbs or panicles; calyx-tube cup-shaped; sepals 5; petals as many, of about equal length; stamens 10–20, short; carpel 1, with 2 pendulous ovules; follicles oblique, with lateral style, dehiscent only at base, with 1 or 2 globose-ovoid lustrous seeds. (Greek *stephanos*, crown, and *aner*, *andros*, man; referring to the persistent crown of stamens.) Four species in E. Asia.

A. Stamens 10: lvs. 2–4 cm. long, deeply lobed.....1. *S. incisa*
AA. Stamens 15–20; lvs. 3–8 cm. long, lobulate.....2. *S. Tanakae*

1. **S. incìsa** Zabel. Shrub to 2.5 m., usually lower; brts. distinctly zigzag, nearly terete: lvs. ovate, long-acuminate, cordate to truncate, 2–4.5 cm., or on shoots to 6.5 cm. long, incisely lobed and serrate, the lower incisions halfway to the midrib, pubescent on the veins beneath; petioles 3–10 mm. long; stipules ovate-oblong to lanceolate, sparingly toothed; fls. 4–5 mm. across, greenish white, in loose terminal panicles 2–6 cm. long; bracts subulate, shorter than the slender pedicels. Fl.vi. Gt.37:537. Gn.88:55(h). B.C. 6:3237. N.K.4:t.14. M.O.t.14. (*S. flexuosa* Sieb. & Zucc., *Spiraea i.* Thunb.) Japan, Korea. Cult. 1872. Zone V.—Graceful shrub with widespreading slender brs. and finely divided bright green lvs. changing to reddish purple in autumn; the small clusters of minute white fls. are rather insignificant.

2. **S. Tánakae** Franch. Shrub to 2 m.; brts. terete or angled: lvs. ovate, long-acuminate, subcordate, 3–8 cm. long, doubly serrate with acuminate teeth and lobulate, the lowest pair of lobes often rather large, spreading and long-acuminate, slightly pubescent on the veins beneath or nearly glabrous; petioles 5–15 mm. long; stipules ovate, serrate: fls. white, about 5 mm. across, in terminal panicles 5–10 cm. long; bracts oblong, often as long as pedicels, partly persistent. Fl.vi–vii. B.M.7593(c). Gt.45:t.1431(c). B.C.6:3237. S.L.399(h). G.W.4:6. Japan. Intr. 1893. Zone V.—Handsome shrub larger and more vigorous than the preceding species; its bright green foliage coloring brilliant orange and scarlet or bright yellow in autumn.

4. **SPIRÆA** L. SPIREA. Deciduous shrubs; buds small, with 2–8 exposed scales: lvs. alternate, simple, dentate or serrate, or sometimes lobed, rarely entire, usually short-petioled, estipulate, penninerved, rarely 3–5-nerved at base: fls. perfect, rarely polygamous, in umbel-like racemes, corymbs or panicles; receptacle cup-shaped or campanulate; sepals 5, usually short; petals 5, usually rounded and longer than the sepals; stamens 15–60, inserted between the disk and the sepals; pistils usually 5, distinct; follicles dehiscent along the inner suture, with several minute, oblong seeds. (Ancient Greek name of a plant used for garlands, derived from *speira*, wreath or band; probably first used for the present genus by Clusius.) More than 80 species in the temperate regions of the n. hemisphere, in Am. s. to Mex., in Asia to the Himal.—Most of the species have been introduced into cult.; many of them, including numerous hybrids originated in cult., are popular garden shrubs and much planted on account of their decorative fls.

KEY TO THE SECTIONS

A. Infl. a simple umbel or umbel-like raceme; fls. white.....Sect. I. *Chamaedryon*
AA. Infl. compound; fls. white to rose-purple.
B. Fls. in corymbs.....Sect. II. *Calospira*
BB. Fls. in panicles.....Sect. III. *Spiraria*

Sect. I. CHAMAEDRYON Ser.

A. Fls. in sessile umbels, without or with very few lvs. at base (in some hybrids the umbels on the lower part of the br. on short leafy stalks).
B. Lvs. dentate or serrate: stamens about ⅓–½ as long as petals.
C. Lvs. ovate to oblong-lanceolate.
D. Umbels all sessile, 3–6-fld.: fls. often double.....1. *S. prunifolia*
DD. Umbels on the lower part of the branch stalked.....3. *S. arguta*
CC. Lvs. linear-lanceolate, glabrous.....2. *S. Thunbergii*
BB. Lvs. entire or crenate-dentate only near apex, often 3-nerved; stamens as long or nearly as long as petals.....4. *S. hypericifolia*
AA. Fls. in umbel-like racemes on leafy brts. (sometimes the upper umbels nearly sessile).
B. Lvs. entire or crenate or dentate near apex.
C. Lvs. 3-nerved.....5. *S. crenata*
CC. Lvs. penninerved.
D. Infl. glabrous: lvs. glabrous or nearly so.
E. Buds long-pointed, with 2 exposed membranous scales.
F. Lvs. obovate to suborbicular, usually crenate at apex: buds shorter than petiole.....6. *S. nipponica*
FF. Lvs. generally oblong, entire: buds longer than petioles.....7. *S. gemmata*
EE. Buds ovoid, small, with several exposed scales.
F. Lvs. usually linear-lanceolate, acute, rarely oblong-obovate.....9. *S. alpina*
FF. Lvs. oval to obovate-oblong, obtuse.....10. *S. myrtilloides*
DD. Infl. pubescent: lvs. pubescent on both sides.
E. Buds pointed, with 2 exposed scales, longer than petioles.....8. *S. mollifolia*
EE. Buds ovoid, obtuse, with imbricate scales, shorter than petioles.....11. *S. cana*
BB. Lvs. serrate or dentate, sometimes slightly lobed (sometimes entire in No. 12).
C. Stamens longer than petals; sepals reflexed in fr.; infl. racemose, the lower pedicels distant.
D. Shoots terete, often pubescent: lvs. pubescent or nearly glabrous, often nearly entire.....12. *S. media*
DD. Shoots angled, glabrous: lvs. glabrous or nearly so.....13. *S. chamaedryfolia*
CC. Stamens shorter than or as long as petals; sepals erect, spreading in fr.; infl. umbel-like, the pedicels crowded.
D. Lvs. glabrous.
E. Lvs. acute.
F. Lvs. rhombic-lanceolate, penninerved.....14. *S. cantoniensis*
FF. Lvs. rhombic-ovate, indistinctly 3-nerved.....15. *S. Vanhouttei*
EE. Lvs. obtuse.
F. Lvs. suborbicular, distinctly 3–5-nerved at base, usually 3-lobed.
16. *S. trilobata*
FF. Lvs. rhombic-ovate to obovate, cuneate at base, penninerved.. 17. *S. Blumei*
DD. Lvs. pubescent beneath.
E. Infl. and follicles glabrous.....18. *S. pubescens*
EE. Infl. and follicles pubescent.....19. *S. chinensis*

Sect. II. CALOSPIRA K. Koch

A. Corymbs on usually short lateral brts. appearing along the mostly arching brs. of the previous year.

BB. Fls. perfect, white.
c. Winter-buds short, ovoid, with several exposed scales or with only 2 in No. 20.
d. Stamens about as long as petals.
e. Winter-buds with 2 exposed scales, pointed: brts. angled.....20. *S. canescens*
ee. Winter-buds obtusish, with several exposed scales.
f. Lvs. serrate at least toward the apex: infl. pubescent.
g. Lvs. 1–2.5 cm. long.....21. *S. Sargentiana*
gg. Lvs. 3–7 cm. long.....22. *S. Henryi*
ff. Lvs. entire or with few teeth. (See also *S. trichocarpa* under No. 6.)
g. Lvs. pubescent above; infl. glabrous or sparingly pilose; follicles pilose.
23. *S. Wilsonii*
gg. Lvs. glabrous above: infl. densely downy; follicles glabrous. 24. *S. Veitchii*
dd. Stamens 2–3 times as long as sepals: infl. glabrous: lvs. doubly serrate. 25. *S. Miyabei*
cc. Winter-buds elongated, longer or nearly as long as petioles: lvs. doubly or incisely serrate.
d. Lvs. glabrous, doubly serrate.....26. *S. longigemmis*
dd. Lvs. pubescent on the veins beneath, incisely serrate.....27. *S. Rosthornii*
bb. Fls. dioecious, pink or white; sepals reflexed in fr.: lvs. sharply serrate.....28. *S. bella*
AA. Corymbs terminal on upright shoots of the year.
b. Stamens as long as petals; fls. white: procumbent shrub; lvs. 1–2.5 cm. long.
29. *S. decumbens*
bb. Stamens longer than petals: upright shrubs.
c. Infl. very compound, flat, besides the terminal corymb, lateral ones blooming later appear beneath, only small brts. with a single corymb; infl. usually pubescent.
d. Lvs. 4–10 cm. long, usually plane.
e. Brts. terete; fls. usually rose-colored.
f. Ripe follicles diverging.....30. *S. japonica*
ff. Ripe follicles upright.
g. Petals ¾ the length of the stamens: follicle pubescent...31. *S. revirescens*
gg. Petals ½ the length of the stamens: follicles glabrous or nearly so.
32. *S. Margaritae*
ee. Brts. more or less angled, rather stiff, nearly glabrous: fls. white..33. *S. albiflora*
dd. Lvs. 1–2 cm. long, bullate: plant rarely taller than 0.25 m.....34. *S. bullata*
cc. Infl. consisting of a single corymb, usually convex: follicles not diverging.
d. Brts. striped: sepals reflexed in fr.
e. Lvs. generally oblong, acute: fls. pink or white.....35. *S. superba*
ee. Lvs. generally elliptic, obtuse, crenate-serrate: fls. white.....36. *S. betulifolia*
dd. Brts. quite terete: sepals upright or spreading in fr.
e. Fls. white.
f. Corymb puberulous.....37. *S. corymbosa*
ff. Corymb glabrous.....38. *S. lucida*
ee. Fls. rose-colored.....39. *S. densiflora*

Sect. III. Spiraria Ser.

A. Infl. a broad panicle, about as broad as high, sometimes consisting of small panicles. (Hybrids between species of Sect. II and III = Sect. *Pachystachya* Zabel.)
b. Panicles small, on lateral brts. at the end of last year's brs.....40. *S. Fontenaysii*
bb. Panicles large, terminal on upright brs.
c. Lvs. glabrous or nearly so.....41. *S. pyramidata*
cc. Lvs. pubescent or tomentulose beneath.....42. *S. sanssouciana*
AA. Infl. an elongated panicle, much longer than broad. (Sect. *Spiraria* proper.)
b. Lvs. glabrous or nearly so.
c. Lvs. sharply serrate, except at the very base, acute.
d. Fls. light pink; infl. tomentulose, rather narrow, the lower brts. ascending and not exceeding their supporting lvs.....43. *S. salicifolia*
dd. Fls. white or slightly pinkish: infl. broad at base, the lower brts. spreading and exceeding their supporting lvs.
e. Infl. tomentulose: lvs. oblong to oblanceolate.....44. *S. alba*
ee. Infl. glabrous: lvs. generally elliptic.....45. *S. latifolia*
cc. Lvs. coarsely serrate above the middle, obtuse: fls. pink.....46. *S. Menziesii*
bb. Lvs. pubescent or tomentose beneath: fls. pink.
c. Follicles glabrous.
d. Lvs. acute at ends, pubescent or thinly tomentulose beneath.....47. *S. Billiardii*
dd. Lvs. obtuse, tomentose beneath.....48. *S. Douglasii*
cc. Follicles pubescent: lvs. usually light tawny beneath, usually oblong-ovate, acute.
49. *S. tomentosa*

Sect. I. Chamaedryon Ser. Shrubs with usually spreading and arching brs.: infl. a sessile fascicle or an umbel-like raceme on short leafy brts. axillary on the brs. of the previous season: fls. white.

1. **S. prunifòlia** Sieb. & Zucc. Shrub to 3 m., with slender pubescent or nearly glabrous angled brts.: lvs. elliptic to elliptic-oblong, acute at ends, 2–5 cm. long, denticulate, glabrous or finely pubescent beneath; petioles 2–3 mm. long: fls. pure white, about 8 mm. across, on slender pedicels in 3–6-fld. sessile umbels usually with a few leafy bracts at base; petals broad-obovate,

longer than stamens: follicles spreading, glabrous. Fl.IV–V. J.C.22:t.12. N.K.4:t.10. Korea, China, Formosa. Cult. 1864. Zone (V).—The form described above is var. **simplicifòlra** Nakai (var. *typica* Schneid.). The form commonly cult. is var. **plèna** Schneid. Young brts. pubescent: lvs. elliptic or ovate, lustrous above, pubescent beneath, of firmer texture; petioles to 5 mm. long: fls. double, about 1 cm. across. S.Z.1:t.70(c). F.S.2:t.153(c). A.G.18:425. F.E.9:503;31:602. Gn.53:185(h). (Var. *fl. pleno* Hort.) Intr. from Japan 1843.—The double-flowered form is a handsome early-flowering shrub with dark green lustrous foliage turning orange in autumn; the single-flowered form is less showy and not much planted.

2. **S. Thunbérgii** Sieb. Shrub to 1.5 m., with slender spreading brs.: brts. angled, pubescent while young: lvs. linear-lanceolate, acuminate, 2–4 cm. long, sharply serrate, glabrous, bright green: fls. pure white, about 8 mm. across, slender-stalked, in 3–5-fld. sessile umbels; petals obovate, much longer than stamens: follicles diverging, with spreading terminal style. Fl.IV–V. S.Z.1:t.69(c). G.F.8:84,85(h). S.L.394(h). Japan, China. Intr. about 1863. Zone V.—Graceful early-flowering shrub, the slender arching brs. clothed with feathery bright green foliage turning late in autumn to orange and scarlet.

3. × **S. argûta** Zabel. (*S. Thunbergii* × *S. multiflora.*) Similar in habit to the preceding, but taller and more vigorous: lvs. oblong-obovate to oblong-oblanceolate, acute, 2–4 cm. long, sharply and sometimes doubly serrate, finally glabrous: fls. pure white, 8 mm. across, in many-fld. umbels usually with small lvs. at base; pedicels glabrous; petals nearly twice as long as stamens. Fl.V. G.C.III.22:3;43:398. G.F.10:443. B.S.2:528. Gg.7:291(h). M.G.1900:16(h). Orig. before 1884.—The most free-flowering and the most showy of the early spireas.

A closely related hybrid is **R. multiflora** Zabel (*S. crenata* × *hypericifolia*). Lvs. obovate, 3–5-nerved at base, serrate above the middle, finely pubescent while young: lower umbels usually on short leafy stalks. Orig. before 1884.

4. **S. hypericifòlia** L. Shrub to 1.5 m., with upright and arching brs.: brts. subterete: lvs. nearly sessile, oblong-obovate to obovate-lanceolate, acute, rarely obtuse, 2–3.5 cm. long, with few small teeth near apex or entire, 3-nerved or penninerved, pubescent or nearly glabrous, grayish green: fls. white, about 6 mm. across; in 5–many-fld. sessile umbels; pedicels pubescent; petals suborbicular, slightly longer than stamens: follicles nearly glabrous, divergent. Fl.IV–V. Ledeb., Ic. Fl. Ross. t.438. S. E. Eu. to Siber. and C. Asia. Cult. 1640. Zone IV.—Var. **acûta** Ser. Lvs. oblanceolate: fls. yellowish white, 3–4 mm. across; petals obovate-spatulate, slightly shorter than stamens, follicles ciliate on the ventral suture. S.O.1,t.55(c, as *S. crenata*). G.O.t.9(c). (*S. acutifolia* Willd.) Cult. 1800.—Var. **obovàta** Maxim. Lvs. obovate, rounded at the usually crenate apex, 3–5-nerved: fls. about 5 mm. across; petals about as long as stamens. S.O.t.56–57(c). G.O.t.11(c). (*S. obovata* Waldst. & Kit.) Cult. 1800.—One of the earliest Spireas to bloom.

S. h. × *media* = **S. micropétala** Zabel. Lvs. obovate-oblong, entire or serrate at apex, 3-nerved or penninerved: umbels sessile and partly on leafy stalks; petals shorter than stamens. Orig. before 1878.—*S. h.* × *cana* = **S. cinérea** Zabel. Lvs. oblong, usually entire: umbels usually sessile on the upper and on leafy stalks on the lower part of the brs.; petals longer than stamens. Orig. before 1884.—*S. h.* × *crenata* = *S. multiflora;* see under No. 3.

A related species is **S. calcícola** W. W. Smith. Low shrub: brts. angled; buds scaly: lvs. obovate to elliptic, obtuse, 4–7 mm. long, entire, glabrous: fls. white, pink outside, in 6–8-fld. umbels; pedicels 2–5 mm. long. Yunnan. Intr. 1915. Zone (V).

5. **S. crenàta** L. Shrub to 1 m., with slender brs., finely pubescent when young: lvs. obovate-oblong to oblanceolate, acutish or rounded at apex, cuneate, 2–3.5 cm. long, crenulate above the middle or entire, distinctly 3-nerved, puberulous when young, grayish green: fls. white, about 5 mm. across, in dense puberulous umbels, on leafy stalks; petals orbicular-obovate, usually shorter than stamens: follicles finely pubescent, with erect styles; sepals upright. Fl.v. G.O.t.10(c). R.I.24:t.147(c). L.B.1252(c). (*S. crenifolia* C. A. Mey.) S. E. Eu. to Cauc. and Altai. Cult. 1800. Zone V.

S. c. × *media* = **S. pikoviénsis** Bess. Lvs. oblong, 2.5–5 cm. long, with a few teeth at apex or sometimes entire, penninerved to 3-nerved, nearly glabrous: infl. nearly glabrous; petals shorter than stamens: follicles with the upright style somewhat below the apex. (*S. Nicoudierti* Hort.) Found wild in Poland. Intr. 1807.—*S. c.* × *cana* = **S. infléxa** K. Koch. Young brts. pubescent: lvs. usually 3-nerved, elliptic-obovate, acute or acutish, pubescent beneath, entire or with a few teeth at apex: infl. pubescent. (*S. conferta* Zabel.) Orig. before 1850.—*S. c.* × *hypericifolia* = *S. multiflora;* see under No. 3.

6. **S. nippónica** Maxim. Shrub to 2.5 m., with upright and spreading brs.; brts. angled, glabrous; buds short, with 2 exposed scales: lvs. obovate to oval, broadly cuneate, 1.5–3 cm. long, crenate at the rounded apex, rarely entire, dark green above, bluish green beneath, chartaceous: fls. 8 mm. across in many-fld. umbel-like racemes, on leafy stalks, the lower pedicels often with a leafy bract and sometimes branched; petals orbicular, longer than the stamens: follicles upright, slightly hairy, with spreading style. Fl.VI. B.S. 2:529. (*S. bracteata* Zabel, not Raf.) Japan. Cult. 1908. Zone V.—Var. **rotundifòlia** Makino. Lvs. larger, broad-obovate or orbicular-obovate: fls. somewhat larger. B.M.7429(c). G.F.7:305. G.C.III.37:149;43:399. J.L.33: f.43(h). (*S. media* var. *rotundifolia* Nichols.) Cult. 1882.—Handsome and vigorous spreading shrub of rather stiff habit with dark green lvs. remaining green until late in autumn and with pure white flowers in showy umbels.

A related species is **S. trichocárpa** Nakai. Shrub to 2 m.: lvs. oblong to oblong-oblanceolate, 2.5–5 cm. long, acutish, entire or with a few teeth at apex: infl. pubescent, 2.5–5 cm. across, compound, its lower brs. with 2–7 fls. and often with a leafy bract: follicles pubescent. N.K.4:t.12. G.C.III.74:87(h). Korea. Intr. 1920. Zone V.—Handsome shrub, similar to *S. nipponica.*

7. **S. gemmàta** Zabel. Shrub to 3 m.; brts. slender, angled, red-brown, glabrous; buds elongated, pointed, with 2 exposed scales, longer than petiole: lvs. short-petioled, narrow-elliptic to oblong, acutish or obtuse, mucronulate, cuneate, 1–2.5 cm. long, entire, rarely with few teeth at apex, grayish green beneath: fls. white, 6–8 mm. across, in few- to many-fld. umbels, the upper ones sessile with lvs. at base, the lower on leafy stalks; the lower pedicels often with a bract in the middle; petals suborbicular, slightly longer than stamens: follicles diverging at the apex, usually hairy on the ventral suture; style terminal, upright or spreading; sepals spreading. Fl.v. S.H.1:f.289h, 290f-g. (*S. mongolica* Koehne, not Maxim.) N. W. China. Cult. 1886. Zone V or IV?

8. **S. mollifòlia** Rehd. Shrub to 2 m., with arching, strongly angled brs.; young brts. pubescent, purplish; buds elongated, pointed, with 2 exposed scales, longer than petiole: lvs. short-petioled, elliptic or obovate to oblong, acute at ends, 1–2 cm. long, entire or with a few teeth at apex, silky-pubescent on both sides: fls. white, about 8 mm. across, in rather dense pubescent umbels about 2.5 cm. across, on short leafy stalks: follicles upright, pubescent, with upright or spreading styles; sepals spreading. Fl.VI–VII. W. China. Intr. 1908. Zone V.—Similar to the preceding species but easily distinguished by the pubescent lvs.

9. **S. alpìna** Pall. Shrub to 1.5 m., with upright or spreading brs.; brts. puberulous when young, angled, red-brown; buds small, ovoid, with imbricate scales: lvs. partly fascicled, short-petioled, oblong-obovate to oblanceolate, obtuse or obtusish, mucronulate, 1–2.5 cm. long, entire, glabrous: fls. yellowish white, about 5 mm. across, in small and dense glabrous umbels on short leafy stalks; petals suborbicular, slightly shorter than stamens: follicles diverging, with ascending styles; sepals half-spreading. Fl.v–vi. Pallas, Fl. Ross.t.20. S.H.1:t.289i,290e-e[3]. N. E. Asia to W. China. Intr. 1886. Zone V.—Much-branched small-leaved shrub of little ornamental merit.

10. **S. myrtilloìdes** Rehd. Shrub to 2.5 m., with slender spreading brs.; brts. sparingly villous while young, angled, brown; buds ovoid, with imbricate scales: lvs. short-petioled, oval to obovate-oblong, obtuse, rarely acutish, 5–15 mm. long, entire, rarely denticulate at apex, glabrous above, paler beneath and sparingly pubescent and ciliolate or nearly glabrous: fls. white, about 6 mm. across, in dense hemispheric umbels sparingly pubescent or glabrous; petals suborbicular, about as long as stamens: follicles upright with spreading styles; sepals upright. Fl.v–vi. W. China. Intr. 1908. Zone V?—Graceful shrub similar to *S. gemmata* but easily distinguished by the winter-buds and the somewhat smaller, slightly pubescent lvs.

11. **S. càna** Waldst. & Kit. Dense bushy shrub to 1 or rarely 2.5 m.; brts. slender, terete, pubescent; buds small, with imbricate scales: lvs. short-petioled, elliptic to oblong, acute at ends, mucronate, 1–2.5 cm. long, entire or rarely with a few teeth at apex, grayish pubescent on both sides, more densely beneath, very silky while young: fls. white, about 6 mm. broad, in dense pubescent umbels on leafy stalks; petals orbicular, about as long as stamens: follicles pubescent, with spreading styles; sepals reflexed. Fl.v. R.I.24:t.148(c). S.L.f.456(h). S. E. Eu. to Italy. Intr. 1825. Zone V.—Neat little shrub, but of little ornamental value.

S. c. × *chamaedryfolia* = **S. Gieseleriàna** Zabel. Lvs. ovate, sharply serrate, rarely nearly entire, pubescent: fls. rather large, in umbels on long leafy stalks, petals as long or slightly shorter than stamens: follicles pubescent on the ventral suture. Orig. before 1884.—*S. c.* × *hypericifolia* = *S. cinerea;* see under No. 4.—*S. c.* × *crenata* = *S. inflexa;* see under No. 5.

12. **S. mèdia** Schmidt. Upright shrub to 1.5 m.; brts. terete, glabrous or pubescent while young; buds small, pointed, with imbricate scales: lvs. ovate to oblong, acute, cuneate, 3–5.5 cm. long, incised-serrate above the middle or sometimes entire, pubescent or nearly glabrous; petioles 1–2 mm. long: fls. in many-fld. glabrous or nearly glabrous umbel-like racemes on usually rather long leafy stalks; petals orbicular, shorter than stamens; disk conspicuous, yellow: follicles pubescent, with spreading or reflexed styles somewhat below the apex; sepals reflexed. Fl.v. S.O.1:t.54(c). R.I.24:t.149(c). N.K.4:t.9. (*S. confusa* Koern.) S. E. Eu. to N. E. Asia. Intr. 1789. Zone IV.—Var. **glabréscens** Simonkai. Nearly glabrous.—Var. **mollis** Schneid. Lvs. villous on both sides: infl. pubescent. (*S. mollis* Koch & Bouché.) S. E. Eu. Cult. 1853.—Var. **serícea** Regel. Lvs. more or less silky-pubescent, sometimes nearly glabrous. S. E. Asia.—Similar to *S. chamaedryfolia*, but of more upright habit, easily distinguished by the terete brts.

S. m. × *chamaedryfolia* = **S. oxýodon** Zabel. Nearly glabrous; brts. slightly angled: lvs. serrate above the middle; follicles with terminal spreading style. Orig. before 1884.—*S. m.* × *hypericifolia* = *S. micropetala;* see under No. 4.—*S. m.* × *crenata* = *S. pikoviensis;* see under No. 5.—*S. m.* × *alba* = *S. microthyrsa;* see under No. 40.

13. **S. chamaedryfòlia** L. Shrub to 1.5 m., with spreading and often arching brs.: brts. glabrous, angled, more or less zigzag; buds acuminate, with

few scales: lvs. elliptic-ovate to oblong-lanceolate, acute to acuminate, usually cuneate, 4–6 cm. long, incised-serrate, nearly glabrous, bright green; petioles 5–10 mm. long: infl. several-fld., glabrous, on short leafy brts., the upper ones sometimes sessile; fls. about 8 cm. across; petals orbicular, shorter than stamens: follicles slightly pubescent, somewhat diverging, with terminal, slightly spreading styles. Fl.v–vi. Ann. Sci. Nat. 1:t.26. (*S. flexuosa* Fisch.) N. E. Asia. Cult. 1789. Zone V or IV.—Var. **stenophýlla** Zabel. Young brts. purplish: lvs. lanceolate.—Var. **ulmifòlia** Maxim. Taller and less spreading, with stouter brs.: lvs. ovate, usually rounded at base and doubly serrate: infl. many-fld., on longer stalks: follicles with upright styles. S.O.1: t.53(c). G.H.t.83(c). R.I.24:t.150(c). (*S. ulmifolia* Scop.) S. E. Eu. to N. E. Asia and Japan. Cult. 1790. Zone IV.—A shrub spreading by suckers, with bright green lvs. and rather large fls.

S. c. × *trilobata* = **S. Schinabéckii** Zabel. Lvs. ovate to oblong-ovate, doubly serrate, the lower ones suborbicular, dark green above; fls. rather large; petals longer than stamens. Orig. before 1884.—*S. c.* × *cana* = *S. Gieseleriana* Zabel; see under No. 11.—*S. c.* × *media* = *S. oxyodon;* see under No. 12.—*S. c.* × *amoena* = *S. nudiflora;* see under No. 28.

14. **S. cantoniénsis** Lour. Shrub to 1.5 m., glabrous, with slender arching subterete brs.; buds small, acute: lvs. rhombic-oblong to rhombic-lanceolate, cuneate, 3–5.5 cm. long, incised-serrate, dark green above, pale bluish green beneath; petiole 6–8 mm. long: fls. about 1 cm. across, in rather dense glabrous umbels; petals suborbicular to oval, longer than stamens: follicles parallel, with terminal spreading styles; sepals upright. Fl.vi. B.R.30:10(c). Gn. 34:304. A.G.18:356(h). G.C.II.19:569(h). (*S. Reevesiana* Lindl., *S. lanceolata* Poir.) China, Japan. Intr. 1824. Zone VI or VII?—Var. **lanceàta** Zabel. Lvs. lanceolate: fls. double. (*S. Reevesiana fl. pleno* Hort.) H.F. 1855:t.11(c). F.S.11:t.1097(c). Cult. 1855.—Handsome shrub with large pure white fls. and dark lvs. remaining green until late in autumn.

S. c. × *chinensis* = *S. blanda;* see under No. 19.

15. × **S. Vanhoúttei** (*S. cantoniensis* × *trilobata*). Shrub to 2 m., with arching brs., glabrous: lvs. rhombic-ovate to rhombic-obovate, acute, rounded or cuneate at base, 2–3.5 cm. long, incised-serrate with obtuse mucronate teeth and usually slightly 3–5-lobed, dark green above, pale bluish green beneath: fls. pure white, 8 mm. across, in many-fld. umbels; petals orbiculate, twice as long as the often partly sterile stamens: follicles slightly diverging; styles half-upright; sepals spreading. Fl.v–vi. Gn.53:251;71:334. G.F.2: 317. F.E.14:389;31:600. Gng.5:210(h). (*S. aquilegiifolia* var. *V.* Briot.) Orig. before 1866. Zone IV.—One of the handsomest of the spring-flowering spireas and much planted.

16. **S. trilobàta** L. Shrub to 1.5 m., with slender spreading brs., glabrous; buds ovoid, obtusish: lvs. suborbicular, rounded or sometimes subcordate at base, 1.5–3 cm. long, incisely crenate-dentate, usually 3-lobed and palminerved, pale bluish green beneath; petiole 5–8 mm. long: fls. pure white, in many-fld. umbels; petals longer than stamens: follicles slightly diverging, obtuse, with ascending style; sepals upright. Fl.v–vi. L.B.1271(c). G.F.1: 452. F.E.30:45(h, as *S. crataegifolia*). N. China to Siberia and Turkest. Intr. 1801. Zone IV.—Handsome shrub similar to the well known *S. Vanhouttei*, but smaller in every part.

S. t. × *chamaedryfolia* = *S. Schinabeckii;* see under No. 13.—*S. t.* × *cantoniensis* = *S. Vanhouttei;* see No. 15.

17. **S. Blùmei** Don. Shrub to 1.5 m., with spreading and arching brs., glabrous: lvs. ovate to rhombic-ovate, obtuse, 2–4 cm. long, incisely crenate-

serrate and often indistinctly 3–5-lobed, pale bluish green beneath and rather prominently veined; petioles 6–8 mm. long: fls. white, polygamous, in many-fld. rather small umbels; petals roundish obovate, longer or as long as the stamens; follicles parallel, with reflexed or spreading styles. Fl.vi. B.H.8: 129,t(c). N.K,4:t.11(as *S. trilobata*). (*S. obtusa* Nakai.) Japan, Korea. Cult. 1858. Zone VI or VII?—Rare in cult.; often the preceding species is cult. under this name.

18. **S. pubéscens** Turcz. Shrub to 2 m., with slender arching brs., pubescent while young; buds small, subglobose: lvs. rhombic-ovate to elliptic, acute, broad-cuneate, 3–4 cm. long, incisely serrate, sometimes slightly 3-lobed, pubescent above, grayish tomentose beneath; petioles 2–3 mm. long: fls. 6–8 mm. across, in glabrous many-fld. umbels; petals about as long as stamens: follicles ciliate on the ventral suture, otherwise glabrous, with the spreading styles slightly below the apex; sepals triangular-ovate, upright. Fl.v. G.F.1:331. N. China. Intr. 1883. Zone V.

A related species is **S. dasyántha** Bge. Lvs. rhombic-ovate, cuneate at base, incisely serrate or lobulate, white-tomentose beneath; infl. grayish tomentose; sepals triangular: follicles tomentulose on the ventral suture. N. China. Intr. 1905?; cult. 1914. Zone V.

19. **S. chinénsis** Maxim. Shrub to 1.5 m., with arching brs., yellowish tomentose when young: lvs. rhombic-ovate or obovate, acutish or rounded at apex, rounded or broad-cuneate at base, 3–5 cm. long, incisely serrate and sometimes 3-lobed, finely pubescent and dark green above, yellowish tomentose beneath; petioles 4–10 mm. long: fls. pure white, about 1 cm. across, in densely pubescent many-fld. umbels; sepals ovate-lanceolate, first spreading, later half upright: follicles pubescent with the spreading styles slightly below the apex. Fl.v. B.R.33:t.38(c). (*S. pubescens* Lindl., not Turcz.) E. China. Intr. 1843. Zone VI or VII.—Handsome shrub, easily recognized by its yellowish tomentum.

S. c. × *cantoniensis* = **S. blanda** Zabel. Lvs. ovate to oblong, acute at ends, incised-serrate, glabrous above, grayish tomentose beneath: fls. pure white, in pubescent umbels: follicles pubescent, with the spreading styles slightly below the apex. (*S. Reevesiana nova* Hort.) Orig. before 1880. Zone VI or VII.

Sect. II. Calospira K. Koch. Infl. a compound, flat or hemispheric corymb, broader than high: fls. often pink to purple, sometimes without glandular disk.

20. **S. canéscens** D. Don. Shrub to 2 or sometimes 4 m., with long arching brs.; brts. angled, pubescent; buds short-pointed, with 2 scales: lvs. very short-petioled, broad-oval to obovate, 1–2 cm. long, crenate-dentate above the middle, grayish green, pubescent or sometimes nearly glabrous beneath: fls. white, rather small, in dense hemispheric, pubescent corymbs 3–5 cm. across, on leafy brts. very numerous along the brs.; stamens about as long as or slightly longer than petals: follicles villous, with the styles slightly below the apex and ascending; sepals upright or spreading. Fl.vii. G.C.III.43:90. Gn.61:380(h);62:414(h). (*S. cuneata, cuneifolia, flagellata, flagelliformis* and *rotundifolia* Hort., *S. vacciniifolia* Hort., not D. Don.) Himal. Intr. 1837. Zone VII?—Var. **myrtifólia** Zabel. Lvs. oblong, dentate near apex or entire, dark green above, glaucescent and slightly pubescent beneath. M.G.21:385. —A graceful shrub with very long arching brs. usually covered their whole length with clusters of white fls.

S. c. × *amoena* = **S. nívea** Zabel. Lvs. coarsely doubly serrate, 2–5 cm. long, pubescent: fls. white or pinkish white in looser corymbs to 10 cm. broad. (*S. expansa nivea* Billiard.) Orig. before 1867.—*S. c.* × *salicifolia* = *S. fontenaysii*; see No. 40.—*S. c.* × *Douglasii* = *S. brachybotrys*; see under No. 40.

The two following are related species resembling *S. bella* in habit; doubtful if at present in cult:—**S. vacciniifólia** D. Don. Brts. terete: lvs. ovate, acute, crenate-

dentate, rarely nearly entire, glaucous and nearly glabrous beneath: fls. white in tomentose corymbs. B.R.26:17(c). P.F.2:98,f.183. (*S. laxiflora* Lindl.) Himal. Intr. 1835. Zone VII?—**S. grácilis** Maxim. Quite glabrous: brts. terete: lvs. slender-petioled, ovate, obtuse, entire or crenate toward the apex, glaucous beneath: fls. white, in lax corymbs. L.B.1403(c). (*S. vacciniifolia* Lodd., not D. Don.) Himal. Intr. 1824. Zone VII?

21. **S. Sargentiàna** Rehd. Shrub to 2 m., with slender spreading brs.; brts. terete, puberulous at first, soon glabrous: buds ovoid, obtusish, with several scales: lvs. short-petioled, elliptic-oblong to obovate-oblong, cuneate, 1–2.5 cm. long, with few acute teeth at apex, puberulous above, villous beneath, chiefly on the veins: fls. creamy-white, about 6 mm. across, in dense villous corymbs 2.5–4 cm. across; petals about as long as stamens: follicles nearly glabrous, with spreading, nearly terminal style; sepals half-upright. Fl.vi. W. China. Intr. 1909. Zone (V).—Graceful shrub similar to *S. canescens;* closely related to the following species, but smaller in every part.

22. **S. Hénryi** Hemsl. Shrub to 2.5 m., with spreading brs.; brts. terete, sparingly pubescent or nearly glabrous; buds ovoid: lvs. obovate to oblong or oblanceolate, acute or rounded, cuneate, 2–7 cm. long, usually coarsely dentate toward the apex, slightly hairy above, villous beneath, particularly on the veins; petiole 4–6 mm. long: fls. white, about 6 mm. across, in rather loose pilose corymbs about 5 cm. across; stamens shorter than petals: follicles hairy, slightly spreading. Fl.vi. B.M.8270(c). G.C.III.72:67. Gn.65:44. J.L.28:f.20. B.C.6:3211. S.L.395(h). C. and W. China. Intr. 1900. Zone (V).—Var. **notàbilis** Farqhar. Corymbs larger.

23. **S. Wilsònii** Duthie. Shrub to 2.5 m., with arching brs.; brts. pubescent while young, dull purplish; buds ovoid, obtuse: lvs. very short-petioled, oval to obovate or oblong, obtuse or acutish, cuneate, 2–5.5 cm. long, dentate at apex or entire, dull green and pubescent above, grayish green and villous beneath, particularly on the veins: fls. pure white, about 6 mm. across, in dense glabrous corymbs, 3–5 cm. across; calyx glabrous; petals as long as stamens: follicles spreading, sparingly pilose on the ventral suture. Fl.vi. B.M.8399(c). G.35:851. C. and W. China. Intr. 1900. Zone V.

24. **S. Veìtchii** Hemsl. Shrub to 4 m., with long arching brs.; brts. puberulous while young, reddish, striped; buds ovoid, pointed: lvs. oval to oblong, rarely obovate, obtuse, broad-cuneate, 2–4 cm. long, entire, glabrous above, puberulous and glaucescent beneath; petiole about 2 mm. long: fls. 4–5 mm. across, white, in pubescent, rather dense corymbs 3–6 cm. across; calyx puberulous; stamens longer than petals: follicles glabrous, parallel. Fl. vi–vii. B.M.8383(c). J.L.35:f.98. Gn.89:567. C. and W. China. Intr. 1900. Zone V.—Handsome shrub.

25. **S. Miyâbei** Koidz. Upright shrub to 1 m.; brts. slightly angled, puberulous while young; buds small, ovoid, with several scales: lvs. ovate to ovate-oblong, acute or acuminate, rounded to broad-cuneate at base, 3–6 cm. long, doubly incised-serrate, green and glabrous or nearly so beneath; petiole 2–5 mm. long: fls. white, about 8 mm. across, in pubescent corymbs 3–6 cm. across; stamens 2–3 times as long as the suborbicular petals: follicles tomentulose, diverging, with subterminal spreading style; sepals spreading. Fl.vi. Japan.—Var. **pilòsula** Rehd. Lvs. larger, to 8 cm. long, pubescent on the veins beneath: infl. sparingly pilose, to 8 cm. across. C. China. Intr. 1907.—Var. **glabràta** Rehd. Lvs. glabrous, larger: infl. glabrous, larger. C. China. Intr. 1907.—Similar to *S. chamaedryfolia ulmifolia,* but easily distinguished by the compound corymb.

26. **S. longigémmis** Maxim. Shrub to 1.5 m., with spreading slender brs., glabrous when young: buds long-pointed, longer than petioles, with 2 exposed scales: lvs. ovate-lanceolate to oblong-lanceolate, acuminate, cuneate, 3–6 cm. long, incisely or doubly serrate, with gland-tipped teeth, bright green, glabrous: fls. white, about 6 mm. across, in rather loose pubescent corymbs 5–7 cm. across; stamens longer than petals; follicles nearly glabrous, with terminal spreading style; sepals spreading. Fl.vi. G.F.7:345. I.T.5: t.92. B.C.6:3212. G.34:443. N. W. China. Intr. 1887. Zone V or IV?—A graceful shrub with bright green foliage.

27. **S. Rosthórnii** Pritz. Shrub to 2 m., with spreading brs.; brts. sparingly hairy while young; buds elongated, pointed, with 2 exposed scales, often as long as petiole: lvs. ovate to ovate-oblong, acuminate, cuneate or rarely nearly rounded at base, 3–8 cm. long, incisely serrate, pubescent on the veins beneath; petioles 5–8 mm. long: fls. white, about 6 mm. across, in rather loose pilose corymbs 5–8 cm. across on elongated brts.; stamens longer than petals: follicles pubescent, diverging, with spreading styles. Fl.vi. W. China. Intr. 1908. Zone V.—A graceful shrub with bright green foliage.

28. **S. bélla** Sims. Shrub to 1 m. with slender spreading brs.; brts. sparingly pubescent while young, angled; buds ovoid, obtuse, with several scales: lvs. ovate-elliptic to ovate-lanceolate, acute at ends, 2–5 cm. long, sharply serrate from below the middle, nearly glabrous, glaucous or glaucescent beneath; petioles 2–3 mm. long: fls. dioecious, pink, about 5 mm. across, in small corymbs 1.5–2.5 cm. across; stamens about as long as petals: follicles pubescent on the inner suture, with spreading styles; sepals reflexed. Fl.vi. B.M. 2426(c). L.B.1268(c). (*S. expansa* Wall.) Himal. Intr. Zone VII?

A closely related species is **S. amoèna** Spae. Shrub to 2 m., more vigorous and upright; brts. tomentose when young, terete: lvs. ovate to ovate-oblong, serrate from the middle, pubescent on the veins beneath: fls. white or pinkish, in large corymbs 3–10 cm. across on upright long brts.: follicles pubescent. Fl.vii. Ann. Soc. Agr. Bot. Gand. 2:t.72(c). (*S. fastigiata* Wall., *S. expansa* K. Koch, not Wall.) Himal. Intr. before 1843. Zone VI?—*S. a.* × ? *bella* = **S. pulchélla** Kunze. With large corymbs of pink fls. (*S. expansa rubra* Hort.)—*S. a.* × *chamaedryfolia ulmifolia* = **S. nudiflòra** Zabel. Lvs. ovate, doubly serrate, nearly glabrous: fls. pinkish white, in compound or sometimes simple pubescent corymbs; longer stamens about twice as long as petals: follicles diverging; sepals reflexed. Orig. before 1890.—*S. a.* × ? = **S. tristis** Zabel. Similar to *S. amoena*, with small white or pink fls. in smaller corymbs; sepals upright in fr. Orig. before 1878.—*S. a.* × *canescens* = *S. nivea;* see under No. 20.—*S. a.* × *japonica* = *S. revirescens;* see No. 31.—*S. a.* × *albiflora* = *S. concinna;* see under No. 31.—*S. a.* × *alba* = *S. brumalis;* see under No. 40.—*S. a.* × *Douglasii* = *S. rubra;* see under No. 42.

29. **S. decúmbens** W. Koch. Dwarf procumbent shrub with ascending brs., about 25 cm. high, glabrous; buds small, obtusish, with few scales: lvs. elliptic to elliptic-oblong, acute at ends, 1–3 cm. long, serrate or doubly serrate: fls. white, in small corymbs 3–5 cm. across, terminal on long leafy brts.; fls. imperfectly dioecious; petals about as long as stamens: follicles glabrous, parallel, with terminal upright style; sepals triangular, spreading or recurved. Fl.vi. R.I.24:t.151(c). G.C.II.11:752. M.G.27:186(h). G.M.57:746(h). (*S. lancifolia* var. *d.* Fiori, *S. procumbens* Hort.) S. Eu. Cult. 1830. Zone V.—Prostrate shrub adapted for rockeries.

A closely related species is **S. lancifòlia** Hoffmanns. Grayish pubescent: lvs. narrower, serrate only toward the apex; sepals in fr. half-spreading. S.H.1:f.291o, 295d-d′. (*S. decumbens* var. *tomentosa* Poech, *S. Hacquetii* Fenzl & Koch.) N. E. Italy. Intr. 1885. Zone V.—*S. l.* × *decumbens* = **S. pumiliònum** Zabel. Slightly pubescent. S.L.395(h). Orig. before 1900.

30. **S. japónica** L. f. Upright shrub to 1.5 m.; brts. glabrous or puberulous when young, striped or nearly terete: buds ovoid, acute: lvs. ovate to ovate-

oblong, acute, cuneate, 2–8 cm. long, doubly incised-serrate, pale or glaucescent beneath and usually pubescent on the veins; petioles 1–3 mm. long: fls. pale to deep pink, sometimes white, 4–6 mm. across, in much-compound and rather loose, usually puberulous, corymbs; stamens much longer than petals; disk crenulate; follicles glabrous diverging with ascending styles. Fl.VI–VII. (*S. callosa* Thunb.) Japan. Cult. 1870. Zone V.—Var. **glabra** Koidz. Lvs. ovate, glabrous: fls. pink, in glabrous corymbs. (Var. *glabrata* Nichols., *S. glabrata* Lge.)—Var. **ovalifòlia** Franch. Lvs. elliptic, glabrous and glaucescent beneath: fls. white, in corymbs 7–12 cm. across. W. China. Intr. 1908.—Var. **acuminàta** Franch. Lvs. ovate-oblong to lanceolate, acuminate, green and pubescent beneath at least on the veins: fls. pink, in corymbs 10–14 cm. across. C. and W. China. Intr. 1908.—Var. **Fortùnei** Rehd. Taller; brts. quite terete, puberulous while young: lvs. oblong-lanceolate, acuminate, 5–10 cm. long, sharply and doubly serrate, with incurved callous-tipped teeth, rugose above, glaucous and glabrous beneath: corymbs much compound, puberulous; fls. pink; disk usually little developed, sometimes wanting. B.M.5164(c). F.S.9:t.871(c). B.H.8:129,t(c). (*S. Fortunei* Planch., *S. callosa* Lindl., not Thunb.) E. and C. China. Intr. about 1850. Zone V. —Forms of this var. are the two following: Var. **atrosanguínea** Zabel. Fls. crimson, in tomentose corymbs.—Var. **rubérrima** Zabel. Fls. deep pink, in puberulous corymbs.—Var. **macrophýlla** Zabel. Lvs. to 14 cm. long, bullate: corymbs small. (*S. Fortunei m.* Simon-Louis.) Orig. before 1866.—Handsome shrub with upright brs. terminated by large very compound corymbs of usually pink fls.

S. j. × *albiflora* = **S. bumálda** Burvenich. Shrub to 0.75, with striped glabrous brts.: lvs. ovate-lanceolate, sharply and double serrate, glabrous: fls. white to deep pink; follicles diverging. R.B.17:12,t(c). S.L.396(h). (*S. pumila* Zabel.) Orig. before 1890. The best known forms are var. **Froèbeli** Rehd. A taller plant with broader, ovate-oblong lvs. and bright crimson fls. (*S. callosa F.* Hort.) F.E. 31:604.—Var. "Anthony Waterer." A compact shrub with rather narrow lvs. and bright crimson fls. Gn.45:49,t(c). G.C.III.14:365.—A very handsome and variable hybrid, often difficult to distinguish from *S. japonica*, but usually of lower, more strictly upright habit and with slightly angled brts.—*S. j.* × *amoena* = *S. revirescens;* see No. 31.—*S. j.* × *superba* = *S. Margaritae;* see No. 32.—*S. j.* × *corymbosa* = *S. Foxii;* see under No. 32.—*S. j.* × *salicifolia* = *S. semperflorens;* see under No. 41.—*S. j.* × *Douglasii* = *S. sanssouciana;* see No. 42.—*S. bumalda* × *bullata* = *S. Lemoinei;* see under No. 34.—*S. bumalda* × *splendens* = *S. assimilis;* see under No. 35.

31. × **S. revirèscens** Zabel. (*S. amoena* × *japonica.*) Shrub to 1 m.; brts. slightly angled, pubescent while young: lvs. short-petioled, oblong-ovate, acuminate, cuneate, 5–9 cm. long, incisely or doubly serrate, glaucescent beneath and densely yellowish pubescent on the veins, midrib brownish toward the base: fls. rose-colored, in broad and loose tomentulose corymbs; petals ¾ the length of the stamens: follicles small, parallel, pubescent; sepals recurved. Fl.VI–VII and IX–X. Orig. before 1890.

A similar hybrid is **S. concínna** Zabel (*S. amoena* × *albiflora*). Brts. pubescent: lvs. ovate-lanceolate, doubly and sharply serrate, pale green beneath and pubescent on the veins, midrib greenish, white near base: fls. pinkish white, in broad leafy corymbs. Orig. before 1890.

32. × **S. Margaritae** Zabel (*S. japonica* × *superba* [*albiflora* × *corymbosa*]). Shrub to 1.5 m.; brts. nearly terete, finely pubescent while young, purple brown: lvs. short-petioled, elliptic-ovate to narrow-elliptic, short-acuminate, cuneate, 5–8 cm. long, coarsely and doubly serrate, pale green beneath and slightly pubescent on the veins or nearly glabrous: fls. 7–8 mm. across, bright rosy-pink, in large leafy puberulous corymbs; calyx pubescent; stamens twice as long as petals: follicles parallel, glabrous, with upright styles; sepals

spreading. Fl.VII. Orig. before 1890.—Handsome hybrid, flowering freely in July and sparingly again in August and September.

A similar but less handsome hybrid is **S. Fóxii** Zabel (*S. corymbosa* × *japonica*). Brts. striped, nearly glabrous: lvs. elliptic, glabrous: fls. smaller, whitish or pinkish, in large puberulous corymbs: follicles parallel, with spreading styles. Orig. before 1870.

33. **S. albiflòra** Zabel. Shrub to 0.5 m., with stiff upright brs.; brts. angled, glabrous: lvs. short-petioled, lanceolate, acuminate, cuneate, 6–7 cm. long, coarsely or sometimes doubly serrate, with callous-tipped teeth, glabrous and bluish green beneath: fls. white, in dense puberulous corymbs, the terminal one large with many smaller ones below; disk conspicuous: follicles glabrous, not or slightly diverging, with spreading styles; sepals reflexed. Fl.VII–VIII. B.C.6:3212. (*S. leucantha* Lge., *S. japonica* var. *a.* Koidz., *S. jap.* var. *alba* Nichols.) Intr. from Japan before 1868. Zone V.—Handsome compact shrub with profusely produced white fls.

S. a. × *japonica* = *S. bumalda;* see under No. 30.—*S. a.* × *amoena* = *S. concinna;* see under No. 31.—*S. a.* × *corymbosa* = *S. superba;* see No. 35.—*S. a.* × *latifolia* = *S. conspicua;* see under No. 41.—*S. a.* × *salicifolia* = *S. syringiflora;* see under No. 41.—*S. a.* × *Douglasii* = *S. intermedia;* see under No. 42.

34. **S. bullàta** Maxim. Upright shrub to 0.4 m.; brts. villous while young, brown: lvs. short-petioled, roundish-ovate to ovate, acute, 1–3 cm. long, incisely serrate, nearly glabrous, thickish and bullate, grayish green beneath: fls. deep rosy-pink in small and dense corymbs forming usually a terminal corymb 4–8 cm. across; stamens reddish, slightly longer than petals; carpels sometimes 6–8, with usually aborted styles. Fl.VII–VIII. Gt.35:t,1216(c). (*S. crispifolia* Hort.) Japan. Cult. 1880. Zone V.

S. b. × *bumalda* = **S. Lemoînei** Zabel. Habit like *S. albiflora:* lvs. ovate, somewhat bullate; fls. rosy-pink. (*S. bumalda ruberrima* Lemoine.) Orig. before 1892.

35. × **S. supérba** Zabel (*S. albiflora* × *corymbosa*). Low shrub with upright brs., nearly glabrous; brts. striped, dark brown: lvs. elliptic-oblong to oblong, acute at ends, 4–7 cm. long, simply or doubly serrate: fls. light rose, or whitish pink, 7–8 mm. across, in a solitary terminal corymb; stamens about twice as long as the suborbicular petals; disk conspicuous: follicles nearly glabrous, parallel; sepals reflexed.[1] Fl. VI-VII. (*S. callosa* var. *superba* Froebel.) Cult. 1873.—*S. s.* × *japonica* = *S. Margaritae;* see No. 32.—A similar hybrid is **S. assímilis** Zabel (*S. bumalda* × *splendens*). Low shrub: lvs. ovate or elliptic, 3–6 cm. long, rather finely doubly serrate, light green and puberulous beneath: fls. small rosy-pink in a puberulous corymb. Orig. before 1890.

36. **S. betulifòlia** Pall. Low much-branched shrub, sometimes to 1 m. high: brts. striped, red-brown, glabrous; buds ovoid, acutish: lvs. short-petioled, broad-oval to elliptic, rounded, rarely acutish at apex, broad-cuneate, rarely rounded at base, 2–4 cm. long, doubly or sometimes simply crenate-serrate, grayish green and reticulate beneath and glabrous or sometimes puberulous on the veins; petioles 1–3 mm. long: fls. white, in dense, glabrous corymbs 3–6 cm. across: follicles glabrous, parallel, with upright styles; sepals reflexed. Fl.VI. Pallas, Fl. Ross. 1:t.16(c). S.H. 1:f294n,295s-s′. N. E. Asia to C. Japan. Intr. 1812?, again in 1892. Zone IV?

37. **S. corymbòsa** Raf. Low shrub, usually sparingly branched, rarely to 1 m.; brts. glabrous or puberulous, terete, purple-brown: lvs. suborbicular to elliptic, acute or obtuse, rounded or broad-cuneate at base, 3–8 cm. long, coarsely and often doubly serrate above the middle, pale bluish green beneath and glabrous or nearly so; petioles 3–8 mm. long: fls. white, rather small, in dense, somewhat convex puberulous corymbs 3–10 cm. broad: follicles

upright, glabrous and lustrous; sepals upright. Fl.VI–VII. L.B.671(c). W.D. 67(c). G.O.t.82(c). B.B.2:246. (*S. crataegifolia* Lk.) N. Y. to Ga. and Ky. Intr. 1819. Zone V.

S. c. × *japonica* = *S. Foxii;* see under No. 32.—*S. c.* × *albiflora* = *S. superba;* see No. 35.—*S. c.* × *latifolia* = *S. notha;* see under No. 41.—*S. c.* × *Douglasii* = *S. pachystachya;* see under No. 42.—*S. c.* × *alba* = *S. difformis;* see under No. 44.

A related species is **S. virginiàna** Brit. Slender shrub to 1.2 m.; brts. pubescent when young: lvs. oblong to oblanceolate, 3–5 cm. long, entire or with few teeth near apex, glabrous or finely pubescent on the veins: corymbs 3–5 cm. across, pubescent. B.B.2:246. Va. to N. C. and Tenn. Cult. 1907. Zone V?

38. **S. lûcida** Dougl. Upright, little branched shrub to 1 m.; glabrous; brts. yellowish brown or brown, terete: lvs. broad-ovate to ovate-oblong, usually acute, sometimes rounded at apex, rounded or broad-cuneate at base, 2–6 cm. long, coarsely serrate or doubly incised-serrate, entire at the lower third or sometimes the lower half, shining above, pale beneath; petioles 3–6 mm. long: fls. white, in rather dense flat glabrous corymbs 3–10 cm. across. Fl.VI–VII. B. C. to Sask., S. Dak., Wyo. and Ore. Cult. 1885. Zone V.

S. l. × *Menziesii* = *S. pyramidata;* see No. 41.

39. **S. densiflòra** Nutt. Low shrub to 0.6 m.; brts. glabrous, terete, dark red-brown: lvs. very short-petioled, oval or elliptic, rounded at ends, rarely acutish, 1.5–4 cm. long, crenate or serrate above the middle, paler beneath: fls. rose-colored, in rather dense glabrous corymbs 1.5–4 cm. across: follicles glabrous, parallel; sepals ovate, obtuse, erect or spreading. Fl.VI. B. C. to Mont., Wyo. and Ore. Intr. 1894. Zone V.—Low shrub with attractive clusters of rose-colored flowers.

A closely related species is **S. splèndens** K. Koch. Taller, to 1.2 m.; young brts. puberulous: lvs. oval to elliptic-oblong, sometimes acute, serrate or doubly serrate, with acuminate teeth, entire toward the base: corymbs finely puberulous or nearly glabrous; sepals triangular, acute. (*S. arbuscula* Greene, *S. rosea* Koehne, not Raf., *S. betulifolia* var. *rosea* Gray.) Ore to Calif. Cult. 1875. Zone VI? or VII. —Possibly only a variety of the preceding species.

S. s. × *bumalda* = *S. assimilis;* see under No. 35.—*S. s.* × *Douglasii* = *S. Watsoniana;* see under No. 42.

Sect. III. SPIRARIA Ser. Infl. a dense panicle, longer than broad; fls. white to rose.

40. × **S. fontenaỳsii** Lebas (*S. canescens* × *salicifolia*). Upright shrub to 2 m., with slender brs.; brts. angled, pubescent while young: lvs. short-petioled, oval to elliptic-oblong, obtuse at ends, 2–5 cm. long, crenate-serrate above the middle, pale bluish green and nearly glabrous beneath: fls. white in pubescent pyramidal panicles 3–8 cm. long; its lower brts. 1–3 cm. long, leafless, terminated by a short and small panicle; petals about as long as stamens: follicles nearly glabrous, spreading. Fl.VI–VII. (*S. fontenaysiensis* Dipp.) Orig. before 1866.—Var. **alba** Zabel is the white-fld. typical form; var. **rôsea** Lebas has rose-colored fls.

Hybrids of similar character are the following: **S. brachybôtrys** Lge. (*S. canescens* × *Douglasii*). Brts. angled, pubescent while young: lvs. narrow-elliptic to oblong, 3–4 cm. long, with a few teeth at apex or serrate above the middle, gray-tomentose beneath: fls. pale rose, in rather dense, usually leafy, less tomentose panicles 3–10 cm. long, with short lateral brts. (*S. pruinosa* Zabel, *S. luxuriosa* Lav.) Orig. before 1867.—**S. microthỳrsa** Zabel. (*S. alba* × *media*). Glabrous; brts. terete: lvs. obovate to oblong or lanceolate, acute or obtuse, 4–6 cm. long, sharply serrate: fls. white, 6–7 mm. across, slender-pediceled, in rather small glabrous panicles to 4 cm. long or sometimes in few-fld. racemes; petals as long as stamens. Orig. before 1890.—**S. brumàlis** Lge. (*S. alba* × ? *amoena*). Brts. puberulous: lvs. oblong-elliptic to oblong, acute at ends, 4–7 cm. long, sharply and often doubly serrate, glaucescent and nearly glabrous below: fls. white, slightly pinkish; infl. a broad terminal panicle with many smaller ones below on leafy brts. Orig. before 1882.

41. × **S. pyramidàta** Greene (*S. lucida* × *Menziesii*). Upright shrub to 1 m.; brts. glabrous, terete, red-brown: lvs. elliptic to oblong, obtuse or acutish, 3–8 cm. long, coarsely and sometimes doubly serrate above the middle, rarely below, glabrous or nearly so; petioles 2–5 mm. long: fls. white or pinkish in rather dense pyramidal, puberulous or sometimes glabrous panicles. Fl.VII. Occasionally with the parents from B. C. to Ore. and Idaho. Intr. 1911. Zone V.

Hybrids of similar character are the following: **S. conspícua** Zabel (*S. albiflora* × ? *latifolia*). Brts. slightly angled: lvs. elliptic-oblong, acute at ends, sharply serrate, nearly glabrous: fls. pinkish white, in broad-pyramidal puberulous panicles; stamens somewhat longer than petals. Orig. about 1875.—**S. syringaeflòra** Lemoine (*S. albiflora* × *salicifolia*). Brts. slightly angled: lvs. oblong-lanceolate to lanceolate, acuminate, serrate above the middle, nearly glabrous beneath: fls. pink, in pyramidal tomentulose panicles, usually with smaller panicles below; stamens twice as long as petals. Orig. before 1885.—**S. semperflòrens** Zabel (*S. japonica* × *salicifolia*). Brts. terete: lvs. oblong-lanceolate, sharply and doubly serrate, glaucescent and nearly glabrous beneath: fls. rose-pink, rather large, in much-branched, broad-pyramidal puberulous panicles; stamens nearly twice as long as petals. (*S. kamaonensis* var. *spicata* Billiard.) Cult. 1870.—**S. notha** Zabel (*S. corymbosa* × *latifolia*). Lvs. oval or ovate to elliptic, obtuse or acutish, broad-cuneate or rounded at base, 3–6 cm. long, coarsely or doubly serrate, glabrous or nearly so: fls. white to pinkish, in pyramidal glabrous panicles; stamens almost twice as long as petals. Orig. before 1890.

42. × **S. sanssouciàna** K. Koch (*S. Douglasii* × *japonica*). Shrub to 1.5 m.; brts. tomentulose while young, striped: lvs. oblong to oblong-lanceolate, usually obtusish, cuneate, 6–9 cm. long, coarsely and often doubly serrate, entire at the lower third or lower half, pale green and tomentulose beneath: fls. rose, in terminal tomentulose corymbs, composed of dense pyramidal obtuse panicles; stamens nearly twice as long as petals: follicles slender, glabrous, parallel, with spreading style; sepals recurved. Fl.VII–VIII. B.M.5169(c). I.H.8:286,t(c). Gn.12:189. (*S. Nobleana* Hook., *S. japonica paniculata* Hort.) Orig. before 1857.

Hybrids of similar character are the following: **S. Watsoniàna** Zabel (*S. Douglasii* × *splendens*). Lvs. elliptic-oblong to oblong, acute or obtusish, usually rounded at base, serrate usually only above the middle, grayish tomentulose beneath: fls. rose, in dense pyramidal tomentulose panicles: follicles small. . (*S. Nobleana* Zabel, not Hook., *S. subvillosa* Rydb.) Orig. in cult. before 1890, also found wild in Ore.—**S. pachystáchys** Zabel (*S. corymbosa* × *Douglasii*). Similar to the preceding, but lvs. broader, elliptic to elliptic-oblong, rounded at base, very short-petioled: fls. light rose: follicles longer than the reflexed sepals. Orig. before 1878.—**S. intermèdia** Lemoine (*S. albiflora* × *Douglasii*). Similar to *S. syringaeflora*, but the lvs. tomentulose beneath.—**S. rubra** Zabel (*S. amoena* × *Douglasii*). Lvs. oblong-lanceolate, 7–9 cm. long, simply or doubly serrate toward the apex, grayish tomentulose beneath; petioles to 8 mm. long: fls. deep rose, in broad-pyramidal or ovoid tomentose panicles: follicles pubescent. (*S. ruberrima* Dipp., *S. expansa rubra* Hort.) Orig. before 1885.

43. **S. salicifòlia** L. Strictly upright shrub with slightly angled yellowish brown brts. puberulous when young: buds small, ovoid, scaly: lvs. short-petioled, oblong-lanceolate to lanceolate, acute at ends, 4–7 cm. long, sharply and closely, sometimes doubly serrate, glabrous and light green beneath: fls. rose, in slender pyramidal pubescent panicles with ascending brs.; calyx puberulous; stamens nearly twice as long as petals: follicles nearly parallel, ciliate on the inner suture, with recurved style; sepals ascending. Fl.VI–VII. S.O.1:t.50(c). R.I.24:t.152(c). S. E. Eu. to N. E. Asia, and Japan. Cult. 1586. Zone V or IV.—Var. **grandiflòra** Loud. With larger, light pink fls. L.B.1988(c). Intr. 1826.—A shrub spreading by suckers, with strictly upright brs., rather attractive in summer with its elongated panicles of rose-colored fls.

S. s. × *alba* = **S. rosálba** Dipp. Lvs. generally lanceolate: fls. light rose, in panicles slender toward the apex, broad at base. Cult. 1892.—*S. s.* × *latifolia* = **S. rubella** Dipp. Similar to the preceding, but lvs. broader. Cult. 1892.—*S. s.* × *canescens* = *S. fontenaysii;* see No. 40.—*S. s.* × *albiflora* = *S. syringaeflora;* see under No. 41.—*S. s.* × *japonica* = *S. semperflorens;* see under No. 41.—*S. s.* × *Douglasii* = *S. Billiardii;* see No. 47.

44. **S. alba** Dur. Upright shrub to 2 m.; brts. puberulous while young, reddish brown, angled: lvs. short-petioled, oblong to narrow-oblanceolate, acute at ends, 3–6 cm. long, sharply serrate, puberulous on the veins beneath or nearly glabrous: fls. white, in leafy pyramidal tomentulose panicles, broad at base, their lower brts. spreading and usually much longer than their supporting lvs.; stamens white, longer than the petals: follicles glabrous; sepals upright. Fl.VI–VIII. W.D.133(c). B.B.2:225. (*S. salicifolia* var. *paniculata* Ait., *S. lanceolata* Borkh.) N. Y. to Mo., s. to Ga. and Miss. Intr. 1759. Zone V or IV.

S. a. × *corymbosa* = **S. difformis** Zabel. Lvs. elliptic to lanceolate-oblong, serrate, glabrous or nearly so: fls. white, in a wide-spreading nearly glabrous panicle. Gn.84:348. Orig. about 1875.

S. a. × *media* = *S. microthyrsa;* see under No. 40.—*S. a.* × *amoena* = *S. brumalis;* see under No. 40.—*S. a.* × *salicifolia* = *S. rosalba;* see under No. 43.—*S. a.* × *Douglasii* = *S. fulvescens;* see under No. 47.—*S. a.* × *tomentosa* = *S. subcanescens;* see under No. 49.

45. **S. latifòlia** Borkh. Shrub to 1.5 m.; brts. glabrous, bright or dark red-brown, angled; lvs. short-petioled, broad-elliptic or obovate to oblong, acute at ends, rarely obtuse at apex, 3–7 cm. long, coarsely and often doubly serrate, glabrous and slightly bluish beneath: fls. white or slightly pinkish, in glabrous broad-pyramidal panicles, the lower brs. spreading and usually much longer than their supporting lvs.; stamens longer than petals; disk usually pinkish: follicles glabrous, with spreading style. Fl.VI–VIII. W.D. 66(c). Em.485,t(c). G.C.III.43:417. (*S. salicifolia* var. *l.* Ait., *S. carpinifolia* Willd., *S. canadensis* Hort., *S. bethlehemensis* Hort. partly.) Nfld. and Can. to N. C. Cult. 1789. Zone I?

S. l. × *albiflora* = *S. conspicua;* see under No. 41.—*S. l.* × *corymbosa* = *S. notha;* see under No. 41.—*S. l.* × *salicifolia* = *S. rubella;* see under No. 43.—*S. l.* × *Douglasii* = *S. macrothyrsa;* see under No. 47.

46. **S. Menzièsii** Dougl. Upright shrub to 1.5 m.; brts. puberulous when young, striped, brown, older ones dark purple: lvs. oblong-obovate to oblong, obtuse at ends, sometimes acute, 3–7 cm. long, coarsely and unequally serrate above the middle; pale green and glabrous or puberulous on the veins beneath; petioles 3–5 mm. long: fls. small, rose, in rather narrow and dense pubescent panicles 10–20 cm. long; stamens more than twice as long as petals: follicles glabrous, with spreading styles; sepals reflexed. Fl.VI–VIII. (*S. Douglasii* var. *M.* Presl.) Alaska to Ore. Intr. 1838. Zone V.—Handsome shrub with rose-colored flowers in summer.

S. m. × *lucida* = *S. pyramidata;* see No. 41.

47. × **S. Billiárdii** Herincq (*S. Douglasii* × *salicifolia*). Shrub to 2 m.; brts. pubescent, brown; lvs. short-petioled, oblong to oblong-lanceolate, acute at ends, 5–8 cm. long, sharply and often doubly serrate except at the lower third, usually grayish tomentulose beneath, at least when young: fls. bright rose, in tomentulose, usually rather narrow and dense panicles 10–20 cm. long; stamens nearly twice as long as petals: follicles glabrous, parallel, with spreading styles. Fl.VII–VIII. H.F.1855:t.2(c). F.E.18:613(h). S.L. 397(h). Orig. before 1854. Zone V.—Here belong probably *S. Lenneana, S. triumphans, S. eximia, S. Constantiae* Hort.

Similar hybrids are the following: **S. fulvéscens** Dipp. (*S. alba* or *tomentosa* × *Douglasii*). Brts. yellowish tomentose: lvs. grayish or whitish tomentose beneath,

sharply serrate above the middle, thinly tomentulose above, with fascicles of small lvs. in the axils of the upper lvs.: fls. bright rose in rather narrow panicles. (*S. eriophylla* Zabel.) Orig. before 1885.—**S. macrothýrsa** Dipp. (*S. Douglasii* × *latifolia*). Lvs. elliptic to obovate-elliptic, nearly glabrous above, tomentulose and light green beneath: fls. bright pink, in dense panicles with almost horizontally spreading brs. (*S. Menziesii* var. *m.* Zabel.) Cult. 1870.

48. **S. Douglásii** Hook. Shrub to 2.5 m.; brts. tomentose, reddish brown, striped: lvs. oblong to narrow-oblong, obtuse or acutish at ends, 3–10 cm. long, unequally serrate above the middle, white-tomentose beneath; petioles 2–4 mm. long: fls. deep rose, in rather narrow or sometimes broad tomentose panicles 10–20 cm. long; stamens twice as long as the obovate petals: follicles glabrous, lustrous, with upright-spreading style; sepals recurved. Fl.VII–VIII. B.M.5151(c). F.S.2:t.66(c). R.H.1846:101,t(c). B. C. to Calif. Intr. 1827. Zone V.—Handsome shrub spreading by suckers, with large panicles of rosy pink fls.

S. D. × *canescens* = *S. brachybotrys;* see under No. 40.—*S. D.* × *japonica* = *S. sanssouciana;* see No. 42.—*S. D.* × *splendens* = *S. Watsoniana;* see under No. 42.—*S. D.* × *corymbosa* = *S. pachystachys;* see under No. 42.—*S. D.* × *albiflora* = *S. intermedia;* see under No. 42.—*S. D.* × *amoena* = *S. rubra;* see under No. 42.—*S. D.* × *salicifolia* = *S. Billiardii;* see No. 47.—*S. D.* × *alba* or *tomentosa* = *S. fulvescens;* see under No. 47.—*S. D.* × *latifolia* = *S. macrothyrsa;* see under No. 47.

49. **S. tomentòsa** L. HARDHACK. Upright shrub to 1.2 m.; brts. brownish tomentose, angled; lvs. ovate to ovate-oblong, acute, 3–7 cm. long, unequally and often doubly serrate, rugulose above, yellowish or grayish tomentose beneath; petioles 1–4 mm. long: fls. deep rose or rose-purple, in narrow and dense, brownish tomentose panicles 8–20 cm. long; stamens somewhat longer than the obovate petals: follicles pubescent, usually diverging; sepals reflexed. Fl.VII–IX. S.O.1:t.51(c). Em.485,t(c). B.B.2:245. G.M.5:344. N. Scotia to Ga., w. to Man. and Kans. Intr. 1736. Zone V.—Var. **alba** West. Fls. white. F.E.8833. Gng.5:149. (*S. t.* f. *albiflora* Macbr.) Cult. 1770.

S. t. × *Menziesii* = **S. pallidiflòra** Zabel. Lvs. elliptic-oblong, abruptly acute, serrate only above the middle, light brownish tomentose beneath: fls. light pink: follicles sparingly pubescent, more densely on the ventral suture. Orig. before 1870.—*S. t.* × *Douglasii* = *S. fulvescens;* see under No. 47.—The spontaneous hybrid **S. subcanéscens** Rydb. (*S. alba* × *tomentosa*) is probably not in cult.

5. **PENTACTÌNA** Nakai. Deciduous shrub; winter-buds with several outer pubescent scales: lvs. alternate, subsessile, dentate, estipulate: fls. perfect, small, in pendulous panicles; sepals 5; petals 5, linear, involute in bud; stamens 20; pistils 5, free, 2-ovuled: follicles glabrous, dehiscent on both sutures; seed spindle-shaped, brown. (Greek *pentas* five, *actine*, ray; referring to the 5 linear petals.) One species in Korea.

P. rupícola Nakai. Decumbent shrub, to 0.7 m.; brts. angled, glabrous; lvs. elliptic to oblanceolate, acute at ends, 2–3 cm. long, with few coarse teeth, glaucescent and sparingly pilose beneath: fls. in elongated panicles 6–8 cm. long; pedicels about 1 mm. long; sepals triangular, reflexed in fr.; petals linear, 5 mm. long; stamens short, white. Fl.VI; fr.IX. Nakai, Rep. Veg. Diamond Mts.t.1. Intr. 1918. Zone V.—Graceful low shrub; well suited for rockeries.

6. **SIBIRAÈA** Maxim. Deciduous shrubs; buds with 2–4 exposed scales, glabrous: lvs. alternate, subsessile, narrow, entire, estipulate, involute in bud: fls. polygamo-dioecious, small, short-pediceled, in terminal panicled racemes; calyx-tube campanulate; sepals short, obtuse, erect; petals roundish-obovate, longer than sepals; stamens about 25, longer than petals in the stam. fls., half as long in the pist. fls.; pistils usually 5, connate at base:

follicles oblong, upright, dehiscent along the whole ventral suture and on the dorsal one near apex; seeds usually 2, rather large, albuminous. (Name from Sibiria, the habitat of the type species.) Two species in Siberia, W. China and S. E. Eu.

S. laevigàta Maxim. Shrub to 1.5 m., with stout upright terete and glabrous brs. purple- or red-brown: lvs. cuneate-oblong, obtuse or acutish, usually mucronulate, 4–10 cm. long, gradually narrowed at base, bluish green, glabrous; fls. white, in glabrous panicles 8–12 cm. long: follicles parallel, about 4 mm. long. Fl.v. G.O.t.89(c). S.O.2:t.49(c). S.B.2:537. S.H.1:f.297e-f[1], 298i-p. (*Spiraea l.* L., *Sibiraea altaiensis* Schneid.) Siberia. Intr. 1774. Zone V or IV?—Var. **angustàta** Rehd. Lvs. narrow-lanceolate or oblanceolate, rarely oblong, acute: infl. puberulous. W. China. Intr. 1908.—Var. **croàtica** Schneid. from S. E. Eu. is not in cult.

A closely related species is **S. tomentôsa** Diels. Low shrub to 0.6 m.: lvs. oblong-obovate to oblanceolate, acute and mucronate, densely silky tomentose beneath, glabrous above: fls. greenish yellow, in dense panicles about 5 cm. long. S. W. China. Intr. 1915.

7. **PETROPHÝTUM** Rydb. Low evergreen prostrate subshrub: lvs. crowded, generally spatulate, entire, estipulate: fls. small, white, short-pediceled, in terminal racemes, sometimes branched at base; sepals 5, valvate; petals 5, imbricate; stamens about 20; disk entire; pistils 3–5, hairy; style slender, longer than stamens: follicles leathery, dehiscent on both sutures; seeds few linear. (Greek *petros*, rock, and *phyton*, plant; alluding to the habitat of the plant.) Five species in W. N. Am.

P. caespitôsum Rydb. Densely cespitose, forming flat patches on rocks: lvs. oblanceolate, obtuse and mucronulate, 6–15 mm. long, 1-ribbed, silky-pubescent: fls. small, white, in dense upright spikes 1.5–4 cm. long, on upright peduncles 2–8 cm. long; petals spatulate, obtuse, 1.5 mm. long; stamens exserted. Fl.VII–VIII. Bot. Gaz.15:t.14. S.H.1:f.297c-d[1]. S.L.45(h). M.G 22:85(h). (*Spiraea caespitosa* Nutt., *Eriogynia c.* S. Wats., *Luetkea c.* Ktze.) Mont., S. Dak. to Calif. and N. Mex. Cult. 1900. Zone V.—Interesting plant adapted for rockeries; likes limestone soil.

The related genus **Kelseỳa** Rydb. which differs chiefly in the solitary fls. with 10 stamens and in the densely imbricated lvs. is not in cult.; its only species is **K. unifiòra** Rydb. from Mont. and Wyo.

8. **LUÈTKEA** Bong. Cespitose undershrub with stoloniferous creeping stems: lvs. alternate, usually twice trifid, estipulate: fls. small, short-pediceled, in upright racemes; sepals 5, acute, valvate; petals 5, oval, contorted in bud; stamens 20, connate at base, shorter than petals; disk 10-lobed; pistils 5, as long as stamens: follicles dehiscent on both sutures; seeds several, linear-lanceolate. (After Fr. Luetke, Russian sea captain, in command of the fourth Russian voyage around the world.) One species from Alaska to Calif. in the high mts.

L. pectinàta Ktze. Glabrous undershrub with long trailing brs. forming dense carpets: lvs. twice or simply trifid, with linear 3-pointed lobes, with the margined slender petiole 1–2 cm. long, bright green: fls. white, 8 mm. across, in racemes 2–5 cm. long, terminating ascending leafy brts. Fl.VII–VIII. (V–VI in cult.) Bot. Gaz.15:t.14. Hooker, Fl. Bor. Am.t.88. (*Spiraea p.* Torr., *Eriogynia p.* Hook.) Cult. 1890. Zone V.—Interesting little undershrub well adapted for rockeries; in habit and foliage similar to *Saxifraga decipiens*.

9. **SORBÀRIA** A. Br. Deciduous shrubs: brts. terete: buds ovoid, with several scales: lvs. alternate, large, pinnate, with serrate lfts., stipulate: fls. small, white, in large terminal panicles; calyx-tube cup-shaped; sepals 5, broad and short, reflexed; petals 5, oval to orbicular, imbricate; stamens 20–50, nearly as long or longer than petals; carpels 5, opposite to sepals, connate at base; follicles dehiscent on the ventral suture; seeds several. (From Sorbus; the lvs. resembling those of the Mountain-Ash.) Syn.: *Basilima* Raf., *Schizonotus* Lindl. Seven species in E. Asia.—Rather large shrubs with pinnate bright green lvs. and conspicuous panicles of white fls.

A. Lfts. doubly and sharply serrate, usually more than 1.5 cm. wide.
B. Panicle with upright brs., rather dense: frs. upright.
C. Stamens 40–50; lfts. with usually 20 pairs of veins.....1. *S. sorbifolia*
CC. Stamens about 20: lfts. with 25 or more pairs of veins.....2. *S. assurgens*
BB. Panicle with spreading brs., loose: frs. on recurved pedicels.
C. Lfts. with mostly simple hairs beneath when young; stamens as long as petals.
3. *S. Lindleyana*
CC. Lfts. with stellate hairs beneath or glabrous; stamens longer than petals.
4. *S. arborea*
AA. Lfts. simply or nearly simply serrate, less than 1.5 cm. wide, glabrous....5. *S. Aitchisonii*

1. **S. sorbifòlia** A. Br. Upright shrub, to 2 m., with stout stems; brts. glabrous or puberulous: lfts. 13–23, lanceolate or ovate-lanceolate, long-acuminate, 5–10 cm. long, doubly serrate, usually glabrous or nearly so beneath: fls. about 8 mm. across, in panicles 10–25 cm. long, more or less puberulous; stamens twice as long as petals; calyx glabrous: follicles glabrous, with terminal recurved style. Fl.VI–VII. S.O.1:t.58(c). Gn.23:248. F.E.30: 777(h). (*Spiraea s.* L., *Basilima s.* Raf., *Schizonotus sorbifolius* Lindl.) N. Asia from Ural to Japan; sometimes escaped from cult. Cult. 1759. Zone I.—Var. **stellípila** Maxim. Lvs. beneath more or less stellate-pubescent: pedicels and calyx puberulous: follicles pubescent. N.K.4:t.1. G.W.15:651(h). (*S. s.* Schneid.) E. Asia. Cult. 1900.—One of the first shrubs to burst into leaf in spring; freely spreading by suckers.

A closely related species is **S. grandiflòra** Maxim. Shrub to 1 m.: lfts. fewer, acute or acutish, obtusely doubly serrate, glabrous: fls. larger, in a rather few-fld. corymbose infl.; stamens as long as petals. Gt.9:t.295(c). (*Spiraea sorbifolia* var. *alpina* Pall., *Spiraea g.* Sweet.) E. Siber. Intr. 1852. Zone II?—**S. Kirilowii** Regel from N. China which differs in the looser panicles, in the stamens being shorter than the petals and in the style inserted below the apex of the follicle, is not in cult.

2. **S. assúrgens** Vilm. & Bois. Shrub to 3 m., with upright or ascending stems: lfts. 13–17, oblong-lanceolate to narrow-lanceolate, long-acuminate, often falcate, 5–8 cm. long, sharply doubly serrate, pubescent on the veins beneath or nearly glabrous, with 25 or more pairs of veins: panicle 10–16 cm. long, less dense than in the first species: calyx glabrous; stamens slightly longer than petals: follicles with terminal slightly recurved or spreading style, glabrous. Fl.VII. V.F.95(h). M.G.32:169(h). China? Intr. 1896. Zone V.—Tall handsome shrub somewhat similar in habit to the fifth species.

3. **S. Lindleyàna** Maxim. Shrub to 6 m., with wide-spreading brs.; brts. and petioles glabrous or nearly so: lfts. 15–21, lanceolate to narrow-lanceolate, long-acuminate, 5–10 cm. long, doubly serrate, with simple hairs on the veins beneath while young: fls. about 6 mm. across, in loose puberulous panicles with spreading brs., 20–30 cm. long and 15–20 cm. broad; stamens about as long as petals: follicles glabrous, 2.5 mm. long, with terminal reflexed style, on recurved pedicels. Fl.VII–VIII. F.S.2:t.108. B.R.31:33(c). G.C.III.43: 415(h). Gn.86:29(h);87:285(h). (*Spiraea L.* Wall., *Basilima L.* Ktze.) Himal. Cult. 1840. Zone VII?—A graceful shrub with wide-spreading brs. and large often nodding panicles.

4. **S. arbòrea** Schneid. Spreading shrub to 6 m.; brts. and petioles usually slightly stellate-pubescent: lfts. 13–17, ovate-oblong to lanceolate, long-acuminate, 4–10 cm. long, sharply doubly serrate, stellate-pubescent or nearly glabrous beneath: fls. 6 mm. across, in large panicles similar to those of the preceding species; stamens much longer than petals: follicles with the spreading style below the apex, on recurved pedicels. Fl.VII–VIII. Gn.88:126. G.M.61:603. G.35:697. C. and W. China. Intr. 1908. Zone V.—Var. **subtomentòsa** Rehd. Brts. and petioles pubescent: lfts. elliptic-oblong, to oblong-lanceolate, densely stellate-pubescent or tomentose beneath, with close-set veins. W. China.—Var. **glabràta** Rehd. Brts. and petioles glabrous, often purplish: lfts. lanceolate to narrow-lanceolate, glabrous; stamens 2–3 times as long as petals.—A graceful shrub similar to the preceding species, but apparently growing taller and much hardier.

5. **S. Aitchisònii** Hemsl. Shrub to 3 m. with upright or ascending stems; brs. glabrous, usually bright red when young: lfts. 15–21, lanceolate to linear-lanceolate, acuminate, cuneate at base, 4–8 cm. long and about 1 cm. broad, simply or slightly doubly serrate, quite glabrous: fls. about 1 cm. across, in upright glabrous panicles 20–25 cm. long and 10–15 cm. wide, leafy at base: follicles with recurved terminal style; stamens longer than petals. Fl.VII–VIII. G.C.III.28:255;38:114;43:397. Gn.68:143;77:560. Gn.M.9:75(h). (*S. angustifolia* Zabel, *Spiraea A.* Hemsl., *Schizonotus A.* Skeels.) Afghan., Kashmir. Intr. 1895. Zone (V) VI.—Handsome shrub, the bright green graceful foliage contrasting well with the bright red stems and petioles.

10. **CHAMAEBATIÀRIA** Maxim. Deciduous upright shrub, stellate-pubescent and glandular: lvs. alternate, bipinnatisect, with numerous minute segments; stipules lanceolate, entire: fls. white, in terminal panicles; calyx-tube turbinate, with 5 erect sepals; petals 5, suborbicular, upright; stamens about 60, inserted at the margin of the disk; carpels 5, pubescent, connate at base, 6–8-ovuled: follicles dehiscent on the ventral suture and at the apex on the dorsal one: seeds few, terete. (Name in allusion to the similarity of the plant to Chamaebatia.) One species.

C. Millefòlium Maxim. Aromatic shrub to 1.5 m.: lvs. short-petioled, ovate-oblong to oblong-lanceolate in outline, 2–7 cm. long, the primary segments linear, deeply pinnatisect with close-set obtuse segments 1–2 mm. long and occasionally toothed: fls. about 1.5 cm. across, short-pediceled, in tomentose leafy panicles 8–15 cm. long; sepals lanceolate: follicles pubescent or nearly glabrous, about 5 mm. long, with upright style. Fl.VII–VIII. B.M. 7810(c). G.F.2:509. G.C.III.40:183. Gn.88:73. M.D.1905,t.11(h). M.G. 23:208(h). (*Spiraea M.* Torr., *Sorbaria M.* Focke.) Idaho and Nev. to Ariz. and Calif. Cult. 1878. Zone V.—Of distinct appearance, with aromatic glandular pubescence; retaining a few lvs. at the end of the brts. during the winter and leafing early in spring; prefers sunny and well drained position.

11. **EXOCHÓRDA** Lindl. Deciduous shrubs; buds ovoid, pointed, glabrous, with imbricate scales: lvs. alternate, petioled, entire or serrate, estipulate or occasionally with small caducous stipules: fls. white, rather large, in terminal racemes; calyx-tube broad-turbinate; sepals 5, very short and broad; petals 5, broadly obovate, clawed, imbricate; stamens 15–30, inserted at the margin of the large disk, with short filaments; carpels 5, connate: fr. a 5-angled deeply furrowed caps. separating into 5 bony, 1–2-seeded carpels dehiscent along both sutures; seeds winged. (Greek *exo*, external, and *chorde*,

chord; referring to the fibres on the external part of the placenta.) Four species from C. Asia to Korea.—Handsome slender-branched shrubs with large white fls. in terminal racemes; they belong to our most striking and graceful spring-flowering shrubs.

A. Stamens 15, 3 in front of each petal; pedicels of the lower fls. to 5 mm. long; petals abruptly narrowed into a short claw; petioles 5–15 mm. long. . . . . 1. *E. racemosa*
AA. Stamens 20–30; fls. short-pediceled or nearly sessile; petals gradually narrowed into the claw.
B. Lvs. of shoots without stipule-like appendages, oval to elliptic-oblong, broad-cuneate at base. . . . . 2. *E. Giraldii*
BB. Lvs. of shoots at least partly with stipule-like appendages, oblong to obovate-oblong, gradually narrowed into the petiole. . . . . 3. *E. Korolkowii*

1. **E. racemòsa** Rehd. Slender spreading shrub to 3 or rarely 5 m., glabrous; lvs. elliptic to elliptic-oblong or oblong-obovate, acute and mucronate, cuneate, 3–6 cm. long, entire or on vigorous shoots serrate above the middle, whitish beneath: fls. white, 4 cm. across, in 6–10-fld. racemes; the lower pedicels to 5 mm. long, the upper shorter; petals suborbicular with a very short claw: fr. broad-turbinate or nearly subglobose, 8–10 mm. long. Fl.IV–V. B.M.4795(c). L.I.t.11, 12. Gt.47:t.1455(c). G.C.III.7:613. Gn.62:161(h). A.F.6:643(h). Gng.5:97(h). F.E.31:971(h). M.G.21:561(h). (*E. grandiflora* Hook.) E. China. Intr. 1849. Zone V.—Var. **prostràta** Rehd. With prostrate brs. (*E. grandiflora* var. *p.* Schwerin.)—Var. **dentàta** Rehd. Young brts., lvs. on midrib beneath and rachis of infl. slightly pubescent: lvs. more often serrate. Cult. 1913.

E. r. × *Korolkowii* = **E. macrántha** Schneid. Differs chiefly in its more upright habit and in the somewhat larger short-stalked fls. with about 20 stamens. R.H.1903:18(h),65. M.G.17:485(h). G.W.16:449. B.S.1:549. Orig. 1900.

2. **E. Giráldii** Hesse. Similar to the preceding: lvs. elliptic to ovate-oblong, acute, broad-cuneate, 4–6 cm. long, entire, rarely crenate-serrate above the middle; petioles 1.2–2.5 cm. long, often red: fls. subsessile or the lower ones short-stalked; petals obovate, gradually narrowed into the claw; calyx often reddish inside; stamens 20–30; caps. turbinate, 1–1.3 cm. long. Fl.v. B.S.1:548. M.D.1909:295. G.W.16:450. (*E. racemosa* var. *G.* Rehd.) N. W. China. Intr. about 1897. Zone V.—Var. **Wilsònii** Rehd. Lvs. elliptic to oblong, occasionally serrate; petioles 1–2 cm. long, green: fls. 5 cm. across; stamens 20–25: caps. to 1.5 cm. long. (*E. racemosa* var. *W.* Rehd.) C. China. Intr. 1907. Zone V.—This species is even handsomer than the preceding one; particularly var. *Wilsonii* which is of more upright and vigorous habit and more floriferous than the type.

A related species is **E. serratifòlia** S. Moore. Shrub to 2 m.: lvs. elliptic, 5–9 cm. long, 3–5 cm. broad, sharply serrate, usually entire below the middle, slightly pubescent beneath at least when young; petiole 1–2 cm. long: fls. about 4 cm. across; petals oblong-obovate, emarginate; stamens 25. N.K.4:t.2. Manch. and Korea. Intr. 1918. Zone IV?

3. **E. Korolkòwii** Lav. Upright slender-branched shrub to 4 m., glabrous: lvs. oblong to obovate-oblong, acute or rarely obtusish, mucronulate, 4–7 cm. long, entire or on stronger shoots often serrate above the middle and at base with 1 or 2 small narrow lobes, gradually narrowed into a petiole 5–15 mm. long: fls. 3–4 cm. across, subsessile, in 5–8-fld. racemes; petals narrow-obovate; stamens 25: caps. about 1.5 cm. long, globose-ovoid, pointed. Fl.IV–V. G.W.16:451. G.31:505. (*E. Alberti* Regel, *E. grandiflora* var. *A.* Aschers. & Graebn.) Turkest. Intr. 1878. Zone V.—Of more upright habit and less floriferous than the other species; one of the first shrubs to burst into leaf.

12. **HOLODÍSCUS** Maxim. Deciduous shrubs, more or less pubescent; buds small, ovoid, with several pubescent scales: lvs. alternate, petioled,

incisely serrate or lobulate, estipulate: fls. very small, in terminal panicles or rarely racemes; calyx-tube cup-shaped; sepals 5, valvate in bud, upright in fr.; petals oval or elliptic, short-clawed little longer than sepals; stamens 15–20 usually slightly longer than petals; disk entire; pistils 5, distinct, developing into short-stipitate, hairy 1-seeded achenes indehiscent and strongly convex on the lower suture; seeds broad-oblong. (Greek *holos*, entire, and *diskos*, disk, referring to the entire disk of the fl.) Syn.: *Schizonotus* Raf., not Lindl., *Sericotheca* Raf.) About 14 closely related species have been distinguished ranging from B. C. to Idaho, Colo. and N. Mex. and s. through Mex. to Columbia.

H. díscolor Maxim. Shrub to 4 m., with spreading and arching brs.: lvs. broad-ovate to ovate, acute, truncate or sometimes broad-cuneate at base, 4–10 cm. long, doubly dentate and lobulate, with broad-ovate teeth, sparingly pubescent and finally glabrous or nearly so above, densely pubescent or grayish tomentose beneath; petioles 1–2 cm. long; fls. creamy white, about 4 mm. across, in ample drooping panicles 8–20 cm. long and 5–15 cm. wide; sepals ovate or ovate-oblong, obtusish; follicles semi-ovate, 1.5 mm. long, with a beak of the same length. Fl.VII. B.R.1635(c). G.F.4:617. B.S.2:533. G.C.III.60:233(h). Gn.76:556(h);87:286(h). J.L.40:33,f.8(h). (*Spiraea d.* Pursh, *Sericotheca d.* Rydb.) B. C. to Calif., Idaho and Mont. Intr. 1827. Zone V.—Var. **arieafòlius** Aschers. & Graebn. (*Spiraea a.* Smith) is the commonly cult. form and has the lvs. grayish green and pubescent below, while the type has the lvs. whitish tomentose below.—Very handsome in bloom with its large panicles of creamy white fls. on slender arching brs.

Closely related species are: **H. dumòsus** Heller. Upright shrub to 1 m.: lvs. generally obovate, cuneate and decurrent at base, 2–5 cm. long, pubescent above, whitish tomentose below: panicle ovoid, narrow, 5–20 cm. long. Bull. Torr. Bot. Club,25:338. (*H. australis* Heller, *H. discolor* var. *d.* Dipp., *Sericotheca dumosa* Rydb.) Wyo. and Utah to N. Mex. and Mex. Intr. 1879. Zone V.—**H. Boursièri** Rehd. Shrub to 1 m.: lvs. flabellate or suborbicular, abruptly contracted into a short winged petiole, rounded at apex, 1–3 cm. long, grayish beneath: infl. 5–7 cm. long, simple or with few short brs. R.H.1859:519. (*Spiraea B.* Carr., *Sericotheca B.* Rydb.) Calif., Nev. Intr. 1853, but apparently not now in cult.—**H. microphýllus** Rydb. Shrub to 1 m.: lvs. elliptic to obovate, 1–1.5 cm. long, cuneate, serrate, finely pubescent above, white silky-villous beneath: infl. 3–7 cm. long, with few spreading brs. (*Sericotheca microphylla* Rydb.) Colo. to Wyo. and Utah. Intr. 1922. Zone V?

Subfam. II. Pomoideae Focke. Trees or shrubs: lvs. simple or pinnate, stipulate: fls. solitary or in umbels, racemes, panicles or corymbs; carpels 2–5, usually 2-ovuled, more or less united and adnate to the cup-shaped calyx-tube, forming an inferior ovary: fr. a fleshy pome. (*Pomaceae* Loisel., *Malacaceae* Small.)

13. **COTONEÁSTER** Med. Deciduous or evergreen shrubs or rarely small trees; buds small, with several imbricate scales: lvs. alternate, short-petioled, entire, with mostly subulate, caducous stipules: fls. white or pinkish, in few to many-fld. corymbs, sometimes solitary, terminal on short lateral brts.; calyx-tube usually turbinate; sepals 5, short; petals upright or spreading, imbricate in bud; stamens about 20; styles 2–5, distinct, carpels more or less connate except on the ventral side; carpels 2-ovuled: fr. a red or black small pomaceous drupe crowned by the persistent calyx-lobes, with 2–5 stones. (Greek *kotoneon*, quince, and *aster*, similar; the lvs. of some species resemble those of the quince.) About 40 species in the temp. regions of Eu., N. Afr. and Asia except Japan.—Ornamental shrubs much planted on account of their attractive frs. and some species also for their white spirea-like fls.

A. Petals upright, small, obovate, usually pinkish, solitary or in few-fld. or many-fld. and nodding corymbs: frs. red or black. (Sect. I. ORTHOPETALUM Koehne.)
B. Fr. red (or purplish black in No. 6).
C. Lvs. glabrous or sparingly pubescent and green beneath, 5–30 mm. long: fls. 1–3, rarely 4: pubescence of brts. strigose.
D. Habit prostrate.
E. Stems appressed to the ground, irregularly branched: lvs. usually wavy at the margin....1. *C. adpressa*
EE. Stems horizontally spreading very regularly distichously branched: lvs. not wavy....2. *C. horizontalis*
DD. Habit upright.
E. Lvs. dull green above.
F. Fls. usually solitary: calyx glabrous....3. *C. rotundifolia*
FF. Fls. 2–4: calyx pubescent....4. *C. Simonsii*
EE. Lvs. lustrous above.
F. Fr. bright red: lvs. usually acute....5. *C. divaricata*
FF. Fr. purplish black: lvs. usually obtuse....6. *C. nitens*
CC. Lvs. tomentose or pubescent beneath (or nearly glabrous and glaucescent in No. 7): fls. 2–many: pubescence of brts. appressed-villous.
D. Calyx glabrous or only slightly pubescent.
E. Lvs. oval to oblong, often obtuse, 2–5 cm. long, smooth above.
F. Lvs. glabrous or nearly so....7. *C. rosea*
FF. Lvs. tomentose beneath....8. *C. integerrima*
EE. Lvs. ovate to ovate-oblong, acute, 3.5–8 cm. long, rugose above....15. *C. bullata*
DD. Calyx densely pubescent or tomentose: lvs. slightly pubescent above, dull green.
E. Lvs. obtuse, rarely acutish.
F. Lvs. whitish tomentose beneath: fr. with 3–5 stones....9. *C. tomentosa*
FF. Lvs. yellowish tomentose beneath: fr. with 2 stones....10. *C. Zabeli*
EE. Lvs. acute or acuminate, rarely acutish.
F. Lvs. grayish or yellowish tomentose beneath.
G. Fr. scarlet or orange.
H. Fls. few: lvs. acute or acutish: fr. scarlet....11. *C. Dielsiana*
HH. Fls. in 6–15-fld. cymes: lvs. acute or acuminate: fr. orange-red 12. *C. Francheti*
GG. Fr. dull brownish red: lvs. 2.5–4 cm. long....13. *C. obscura*
FF. Lvs. sparingly pubescent beneath, finally often glabrescent.
G. Fr. ellipsoid, slightly pubescent, with usually 2 stones: calyx pubescent: lvs. pubescent above....14. *C. acuminata*
GG. Fr. subglobose, with 4–5 stones: calyx slightly pubescent or glabrous: lvs. glabrous above, usually bullate....15. *C. bullata*
BB. Fr. black.
C. Lvs. acute or acuminate.
D. Lvs. pubescent above when young, dull green: calyx pubescent.
E. Lvs. generally acuminate, 4–10 cm. long: fr. with 3–5 stones.
F. Infl. many-fld.: lvs. rugose above, reticulate beneath....16. *C. moupinensis*
FF. Infl. 3–7-fld.: lvs. neither rugose nor reticulate....17. *C. foveolata*
EE. Lvs. generally acute, 3–5 cm. long: fr. usually with 2 stones....18. *C. acutifolia*
DD. Lvs. glabrous and lustrous above: calyx glabrous or slightly pubescent. 19. *C. lucida*
CC. Lvs. obtuse or acutish, whitish tomentose beneath: calyx glabrous. 20. *C. melanocarpa*
AA. Petals spreading, suborbicular, white: fr. red (brown in *C. affinis*, see under No. 25, black in *C. Lindleyi*, see under No. 23.) (Sect. 2. CHAENOPETALUM Koehne.)
B. Fls. in many-fld. corymbs: upright shrubs.
C. Lvs. deciduous, green or grayish, not papillose beneath: anthers yellow.
D. Lvs. suborbicular to elliptic, obtuse or acute, to 3.5 cm. long.
E. Lvs. glabrous at maturity....21. *C. multiflora*
EE. Lvs. tomentose beneath.
F. Lvs. ovate to elliptic, usually acute, grayish tomentulose beneath; calyx villous....22. *C. hupehensis*
FF. Lvs. suborbicular to elliptic, usually obtuse, white-tomentose beneath: calyx tomentose....23. *C. racemiflora*
DD. Lvs. narrow-elliptic to oblong-lanceolate, acute at ends, usually glabrous at maturity, to 10 cm. long....24. *C. frigida*
CC. Lvs. evergreen or half-evergreen, subcoriaceous or coriaceous: anthers purple.
D. Lvs. with persistent close white tomentum beneath, 2–3 cm. long....25. *C. pannosa*
DD. Lvs. with floccose or woolly tomentum beneath, finally usually more or less glabrous and glaucous: 3–12 cm. long.
E. Lvs. glabrous above, not or slightly papillose beneath, 1–2 cm. broad. 26. *C. salicifolia*
EE. Lvs. pubescent above while young, papillose beneath, 2–3 cm. broad. 27. *C. Henryana*
BB. Fls. 1–3: prostrate or trailing evergreen shrubs.
C. Lvs. green or glaucescent, not papillose beneath, soon glabrous, over 1.5 cm. long. 28. *C. Dammeri*
CC. Lvs. glaucous and papillose beneath, less than 1.5 cm. long.
D. Lvs. suborbicular or broad-oval: fls. 1–3....29. *C. prostrata*
DD. Lvs. obovate to cuneate-oblong: fls. usually solitary....30. *C. microphylla*

1. **C. adprẽssa** Bois. Deciduous prostrate shrub, with irregularly branched creeping stems: lvs. broad-oval or obovate, acutish or obtuse, mucronulate, 5–15 mm. long, usually wavy at the margin, dull green above, ciliolate and sparingly pubescent beneath while young: petioles 1–2 mm. long: fls. 1–2, pinkish, subsessile; calyx slightly pubescent: fr. subglobose, 6–7 mm. long, bright red, usually with 2 stones. Fl.VI; fr.VIII–IX. V.F.116. S.H.1:f.418k-m, 419e[1]. S.L.164(h). (*C. horizontalis* var. *a.* Schneid.) W. China. Intr. 1896. Zone V.—Prostrate shrub with the brs. closely appressed to the ground and often rooting, with ornamental bright red fr. in late summer and autumn; well adapted for rockeries.

2. **C. horizontàlis** Decne. Half-evergreen low shrub with horizontally spreading distichously branched stems: lvs. suborbicular to broad-elliptic, acute at ends and mucronate at the apex, 5–12 mm. long, dark green, glabrous and lustrous above, sparingly strigose-pubescent beneath; petioles 1–2 mm. long, strigose-pubescent: fls. 1–2, pinkish, subsessile: fr. subglobose, about 5 mm. across, bright red, with usually 3 stones. Fl.VI; fr.IX–X. R.H.1889:348,t(c). G.C.III.32:91. Gn.66:407(h);87:28. S.L.165(h). (*C. Davidiana* Hort.) W. China. Intr. about 1880. Zone V.—Var. **variegàta** Osborn. Lvs. variegated with white. R.H.1916:137(h).—Var. **perpusílla** Schneid. Lvs. 6 mm. long or less. W. China. Intr. 1908.—Handsome and very distinct shrub with horizontally spreading brs. closely and regularly set with 2-ranked brts.; the frs. are smaller but more numerous than in the preceding species and ripen later; the lvs. are subpersistent and turn partly red and orange in late autumn.

3. **C. rotundifòlia** Wall. Deciduous or half-evergreen shrub, to 2.5 m., with more or less distichously arranged brts.: lvs. suborbicular to broad-obovate or broad-oval, usually nearly rounded and abruptly mucronate at apex, broad-cuneate at base, 8–12 mm. long, dark green above, sparingly pubescent on both sides at least while young, but less so and lighter green beneath: fls. usually solitary, white, suffused with pink, short-pediceled; calyx glabrous; sepals semiorbicular, denticulate: fr. broad-obovoid, 1 cm. long, scarlet. Fl.VI; fr.IX–X. B.M.8010(c). (*C. disticha* Lange.) Himal., S. W. China. Intr. 1825. Zone V.—Half-evergreen shrub, in its mode of branching similar to the preceding species, but upright and with larger fr.

Closely related species are: **C. verruculòsa** Diels. Differs chiefly in the less pubescent densely verruculose brts. and in the more coriaceous glabrous lvs. Yunnan. Intr. ?—**C. apiculàta** Rehd. & Wils. Lvs. quite glabrous at maturity or only slightly ciliate, to 1.5 cm. long: fr. subglobose, subsessile; sepals short-acuminate. W. China. Intr. 1910. Zone V.

4. **C. Simónsii** Bak. Deciduous or half-evergreen shrub to 3 or rarely 4 m., of upright habit: lvs. orbicular-obovate to broad-elliptic, acute or slightly acuminate, broad-cuneate, 1.5–3 cm. long, dark green above and pubescent while young, paler and pubescent beneath, chiefly on the veins; petioles pubescent, 2–3 mm. long: fls. white, in short, 2–4-fld. cymes; calyx appressed-pubescent; sepals triangular, acutish to acuminate: fr. short-ellipsoid or obovoid, 8 mm. long, scarlet. Fl.VI–VII; fr.X. Ref. Bot. 1:55(c). Gt.55:t. 1551,f.5(c). Gn.87:42. (*C. Simmondsii* or *Symonsii* Hort.) Khasia. Cult. 1869. Zone V.—Handsome half-evergreen shrub with scarlet fruit in late autumn.

5. **C. divaricàta** Rehd. & Wils. Deciduous upright shrub to 2 m., with spreading brs.: lvs. elliptic or broad-elliptic, acute at ends or sometimes rounded at apex, 8–20 mm. long, lustrous dark green above, lighter and slightly pubescent on the midrib or glabrous beneath: fls. pink, short-pediceled,

in usually 3-fld. cymes; calyx slightly pubescent; sepals triangular, acute or acuminate: fr. ellipsoid, 8 mm. long, about 6 mm. thick, red; stones 2. Fl. VI; fr.IX. C. and W. China. Intr. 1907. Zone V.—Handsome shrub with slender spreading brs. and bright red frs. profusely produced; one of the best red-fruiting species.

6. **C. nítens** Rehd. & Wils. Deciduous densely branched shrub, with slender spreading brs.: lvs. oval or sometimes ovate, rounded at ends or sometimes acutish, 8–20 mm. long, lustrous and dark green above, lighter and sparingly pubescent beneath while young, soon glabrous: fls. pink, in usually 3-fld. cymes; calyx slightly pubescent; sepals broad-triangular, obtusish: fr. globose-ellipsoid, 7 mm. long, purplish black; stones 2. Fl.VI; fr.VIII–IX. W. China. Intr. 1910. Zone V.

7. **C. rósea** Edgew. Deciduous shrub with slender brs., to 2 m. tall or more; brts. pubescent at the tips, soon glabrous: lvs. elliptic or ovate to ovate-oblong, acutish or obtuse, mucronulate, rounded or broad-cuneate at base, 2–6 cm. long, bluish green above, grayish green beneath and slightly pubescent at first, soon glabrous: petioles 2–5 mm. long, glabrous: fls. pinkish in 3–9-fld. glabrous cymes; sepals broad-triangular to ovate, obtuse; petals slightly spreading: fr. globose-obovoid, 7 mm. long, red; stones 2. Fl.VI; fr.IX–X. S.H.1:f.423r-s,424n. N. W. Himal., Afghan. Intr. 1882. Zone V. —Graceful shrub, in fr. similar to *C. racemiflora*, but glabrous.

8. **C. integérrima** Med. Upright bushy shrub to 2 m.; young brts. appressed-woolly, becoming glabrous and lustrous: lvs. suborbicular to broad-ovate or oval, obtuse or acute, usually mucronate, rounded at base, 2–5 cm. long; dark green and glabrous above, whitish or grayish tomentose beneath; petioles 2–4 mm. long, pubescent: fls. pinkish, in nodding glabrous 2–4-fld. cymes; sepals rounded: fr. subglobose, 6 mm. across, red; stones usually 2. Fl.V; fr.VIII. H.W.3:73. R.I.25:t.96(c). G.H.t.71(c). (*C. Cotoneaster* Karst., *C. vulgaris* Lindl.) Eu., N. Asia to Altai. Intr. 1656. Zone V.—A much branched round shrub with rather short and stiff brs. and ornamental red fr.

The closely related **C. uniflòra** Bge. with smaller lvs. glabrous at maturity and usually solitary short-stalked fls. from the Altai is possibly only a var. of the preceding species. Cult. 1907. Zone V or IV?—Another related species is **C. Silvéstrii** Pampan. Lvs. elliptic-ovate; calyx pubescent: fr. orange. C. China. Intr. 1907. Zone V?

9. **C. tomentòsa** Lindl. Shrub to 3 m.; young brts. tomentose: lvs. broad-oval to elliptic or rarely oblong-ovate, obtuse or sometimes acutish, 3–6 cm. long, dull green above and pubescent while young, whitish or grayish tomentose beneath; petioles 3–6 mm. long: fls. pinkish, in nodding 3–12-fld. pubescent cymes; calyx tomentose: fr. subglobose, 7–8 mm. across, brick-red; stones 3–5. Fl.V–VI; fr.IX. G.O.t.105(c). R.I.25:t.97(c). H.W.3:73. W.D.55(c). S. E. Eu., W. Asia. Intr. 1759. Zone V.—Similar to *C. integerrima*, but larger in every part and more pubescent.

10. **C. Zabèli** Schneid. Shrub to 2 m., with slender spreading brs.; young brts. densely pubescent: lvs. broad-oval to ovate, obtuse, rarely acutish, 1.5–3 cm. long, dull dark green and loosely pubescent above, grayish or yellowish tomentose below; petioles 1–3 mm. long: fls. pinkish, in 3–9-fld. pubescent nodding cymes; calyx villous, with obtuse lobes, soon glabrous: fr. globose-obovoid, 7–8 mm. long, bright red; stones 2. Fl.V; fr.IX–X. S.H.1:f.420f-h, 422i-k. C. China. Intr. 1907. Zone V.—Var. **miniàta** Rehd. & Wils. Fr. smaller, light orange-scarlet; lvs. turning yellow in autumn.—Handsome slender-branched shrub with bright red fruit.

11. **C. Dielsiàna** Pritz. Shrub to 2 m., with slender spreading and arching brs.; young brts. densely pubescent: lvs. elliptic to ovate, acute or acutish, rarely obtuse, rounded or broad-cuneate at base, 1–2.5 cm. long, slightly pubescent and dark green above, yellowish or grayish tomentose beneath: fls. pinkish, in short 3–7-fld. pubescent cymes; calyx pubescent; sepals triangular, mucronate: fr. subglobose, about 6 mm. across, scarlet; stones 3–4. Fl.VI; fr.IX–X. Gs.1:185. S.L.165(h). (*C. applanata* Duthie.) C. and W. China. Intr. 1900. Zone (V) VI.—Var. **màjor** Rehd. & Wils. Lvs. broader and larger.—Var. **élegans** Rehd & Wils. Lvs. subpersistent, smaller, finally nearly glabrous and somewhat shining above: fr. coral-red. W. China. Intr. 1908.—A graceful shrub very ornamental in autumn with its long arching or pendulous brs. densely studded with scarlet frs.

12. **C. Franchéti** Bois. Half-evergreen upright shrub with spreading brs.; young brts. densely pubescent: lvs. thickish, elliptic to ovate, acute or acuminate, broad-cuneate, 2–3 cm. long, pubescent above at first, finally glabrous and somewhat lustrous, yellowish or grayish white-tomentose beneath; petioles 1–3 mm. long: fls. pinkish, small, in 5–11-fld. pubescent cymes, on lateral brts. sometimes to 4 cm. long; calyx villous; sepals triangular, acuminate: fr. ovoid, 6–7 mm. long, orange-red, sparingly pubescent or finally glabrous; stones usually 3. Fl.VI; fr.IX–X. B.M.8571(c). R.H.1902: 379;1907:256,t(c). V.F.118. W. China. Intr. 1895. Zone VI?—Var. **cinerâscens** Rehd. More vigorous: lvs. elliptic-ovate, to 4 cm. long, more loosely tomentose and grayish or greenish beneath: infl. many-fld., on brts. to 5 cm. long. W. China. Intr. 1915. Zone VII?—Handsome half-evergreen shrub with small lvs. and profusely produced orange-red frs.

A closely related species is **C. amoèna** Wils. which differs chiefly in its bushy habit, with short stiff brs., smaller lvs. and denser and smaller cymes with shorter pedicels, and in the aristate sepals. G.C.III.51:2. S. W. China. Intr. 1904. Zone VII?

13. **C. obscûra** Rehd. & Wils. Deciduous shrub to 3 m., with spreading brs.; young brts. pubescent: lvs. elliptic-ovate or sometimes rhombic-ovate, acuminate, rarely acute, broad-cuneate, 2.5–4, rarely 5 cm. long, dull green above and slightly pubescent, at least while young, yellowish gray-tomentose beneath; petioles 2–3 mm. long, pubescent: fls. pinkish, in short dense, 3–7 fld. pubescent cymes, on very short lateral brts., sepals triangular, acuminulate; fr. broad-pyriform, dark red, 7–8 mm. long; stones usually 3. Fl.VI; fr.IX–X. W. China. Intr. 1910. Zone V.—Var. **cornifòlia** Rehd. & Wils. Lvs. elliptic-ovate to elliptic-oblong, 4–7 cm. long, less pubescent beneath, veins more deeply impressed: fr. purple-black; stones 5. W. China. Intr. 1910.—Bushy shrub with numerous dark red frs. in autumn.

Closely related species are: **C. reticulàta** Rehd. & Wils. Lvs. subcoriaceous, elliptic-ovate, 2.5–4 cm. long, wrinkled above, reticulate and yellowish tomentose beneath: fr. subglobose, 3–6 in glabrous cymes, purplish black, 5–7 mm. across; stones 5. W. China. Intr. 1910. Zone VI?—**C. glomerulàta** W. W. Sm. Lvs. oblong-ovate, 3–5 cm. long, fulvous-tomentose beneath: cymes dense, many-fld.: fr. about 5 mm. long, crimson; stones usually 5. W. China. Intr. 1912?

14. **C. acuminàta** Lindl. Deciduous shrub to 4 m., of upright habit; young brts. densely pubescent: lvs. elliptic-ovate to ovate-oblong, acuminate or acute, broad-cuneate, 3–6 cm. long, dull green above and pubescent while young, paler green and more densely pubescent beneath, usually glabrescent at maturity; petioles 2–5 mm. long, pubescent: fls. pinkish, in 2–5-fld. short, pubescent cymes; calyx pubescent; sepals broad-triangular, acute or obtuse: fr. ellipsoid, 8–10 mm. long, bright red, hairy near apex; stones 2. Fl.VI; fr. IX–X. L.B.919(c). R.H.1899:348,t.f.5(c, as *C. nepalensis*). S.H.1:f.418r-t,

419i. Himal. Intr. 1820. Zone V.—Handsome vigorous shrub of upright habit, very ornamental in autumn with its bright red rather large fr.

15. **C. bullàta** Bois. Deciduous spreading shrub to 2 m.; young brts. pubescent: lvs. elliptic-ovate to ovate-oblong, acuminate, broad-cuneate, rarely rounded at base, 3.5–8 cm. long, slightly pubescent or nearly glabrous above and rugose or more or less bullate, paler or grayish green beneath and reticulate, sparingly pubescent, more densely on the veins or sometimes nearly glabrous; petioles 3–6 mm. long; fls. pinkish, 3–7; calyx glabrous; sepals very short, rounded: fr. subglobose or obovoid, 6–8 mm. long, red; stones 4–5. Fl.v–vi; fr.viii–ix. V.F.119. M.O.205. W. China. Intr. 1898. Zone V.—Var. **floribúnda** Rehd. & Wils. Petioles shorter: cymes many-fld. 4–6 cm. across; calyx slightly pubescent. B.M.8284(c). H.B.3:449. (*C. moupinensis* var. *f.* Stapf.)—Var. **macrophýlla** Rehd. & Wils. Similar to the preceding var., but lvs. 6–12 cm. long, often nearly glabrous: calyx nearly glabrous.—Handsome shrub with large clusters of bright red frs. in autumn.

16. **C. moupinénsis** Franch. Shrub to 5 m., with spreading brs.: lvs. elliptic- or rhombic-ovate to ovate-oblong, acuminate, broad-cuneate or sometimes rounded at base, 4–10 cm. long, dull green, slightly pubescent, rugose and usually bullate above, light green and pubescent beneath, at least on the veins, reticulate; petioles 2–3 mm. long, pubescent: fls. pinkish, in many-fld. corymbs; calyx slightly pubescent; sepals triangular, acutish: fr. subglobose or obovoid, 6–8 mm. long, black; stones 4–5. S.H.1:f.421d-e,423i-k. Fl.vi; fr.ix–x. W. China. Intr. about 1900. Zone VI?—Similar to *C. bullata*, but with black fr.

17. **C. foveolàta** Rehd. & Wils. Shrub to 3 m. with spreading brs.; brts. densely pubescent, later gray or grayish yellow: lvs. elliptic or rhombic-ovate to ovate-oblong, acute or acuminate, broadly cuneate or rounded at the base, 4–8 cm. long, slightly and loosely pubescent above while young, soon glabrous and smooth, pubescent beneath, chiefly on the veins, finally often nearly glabrous, veins prominent beneath and impressed above; petioles 2–3 mm. long, pubescent or nearly glabrous: fls. pinkish in 3–6-fld. pubescent cymes; calyx densely pubescent; sepals broad-triangular, acute: fr. subglobose, 6–8 mm. long, black; stones 3–4, furrowed and shallowly pitted on the back. Fl.vi; fr.ix. C. China. Intr. 1907. Zone V.—Handsome shrub of vigorous growth with the lvs. turning bright scarlet and orange in autumn.

18. **C. acutifòlia** Turcz. Shrub to 4 m., with slender spreading brs.; brts. pubescent, later red-brown: lvs. elliptic-ovate to oblong-ovate, acute, rarely acuminate, broad-cuneate, 2–5 cm. long, dull green and slightly pubescent above at first, lighter green beneath, sparingly pubescent, more densely on the veins, finally often nearly glabrous; petioles 2–5 mm. long, pubescent: fls. pinkish, in 2–5-fld. short pubescent cymes; calyx-tube pubescent, lobes triangular, acute: fr. ellipsoidal, about 1 cm. long, black, usually with 2 stones. Fl.v–vi; fr.ix–x. S.H.1:f.421a-b,423d-f. (*C. pekinensis* Zab.) N. China. Intr. 1883. Zone V or IV?—Var. **villòsula** Rehd. & Wils. Lvs. more densely villous beneath, somewhat larger; calyx-tube more densely villous: fr. thinly pubescent. C. & W. China. Intr. 1900. Zone V.

Closely related species are: **C. ambígua** Rehd. & Wils. which differs chiefly in its slightly pubescent or nearly glabrous calyx-tube and subglobose or obovoid fr. with 3–4 stones. W. China. Intr. ? 1902. Zone V.—**C. tenúipes** Rehd. & Wils. Slender shrub to 2 m.: lvs. narrow-elliptic to ovate, 1.5–3.5 cm. long, densely villous beneath: cymes 2–4-fld., densely villous: fr. on slender, though short stalks; stones 2. W. China. Intr. 1910. Zone V.

19. **C. lùcida** Schlecht. Deciduous shrub to 3 m., of upright habit; young

brts. pubescent: lvs. elliptic to ovate, acute, broad-cuneate, rarely rounded at base, 2–5 cm. long, glabrous and lustrous above, pubescent beneath, finally often nearly glabrous; petioles 2–5 mm. long, nearly glabrous: fls. pinkish, in 3–8-fld. slightly pubescent cymes; calyx-tube glabrous or slightly pubescent; fr. subglobose or obovoid, 8–10 mm. long, black, with 3–4 stones. Fl.v–vi; fr.ix. D.H.3:413. S.H.1:f.421c,423a-c. G.W.5:247. (*C. acutifolia* Lindl., not Turcz.) Altai Mts. Cult. 1840. Zone V or IV.—A handsome shrub with lustrous lvs. and rather large black frs.

20. **C. melanocárpa** Lodd. Shrub to 2 m., with spreading brs., brts. pubescent when young: lvs. broad-ovate to ovate-oblong, obtuse or acute, often mucronulate, sometimes emarginate, rounded at base, 2–4.5 cm. long, dull dark green above, slightly pubescent at first, whitish tomentose beneath; petioles 3–8 mm. long: fls. pinkish in 3–8-fld. nodding, glabrous or slightly pubescent corymbs; calyx glabrous: fr. subglobose, 6–7 mm. across, black; stones usually 2. Fl.v–vi; fr.viii. L.B.1531(c). R.I.25:t.98(c). (*C. nigra* Fries.) Eu. to C. and N. E. Asia. Cult. 1829. Zone IV.—Var. **laxiflòra** Schneid. Lvs. larger, to 6 cm. long; corymbs pendulous, 12–many-fld. B.R.1305(c). R.I.25:t.98,f. 4–6(c). (*C. l.* Lindl.) Asia. Intr. 1826.—Var. **commíxta** Schneid. Lvs. of shoots ovate, acute and mucronulate; infl. 8–15-fld. B.M.3519(c).

A closely related species is **C. ignàva** Wolf. Lvs. 2.5–5 cm. long, those of the shoots ovate, acute and mucronulate: infl. many-fld., pendulous, tomentose; calyx glabrous except at base; fr. dark purple. Yearb. For. Inst. Petersb.15:240,t. E. Turkest. Intr. about 1880? Zone V?

21. **C. multiflòra** Bge. Shrub to 2 m., with usually slender arching brs.; brts. pubescent at first, soon glabrous, purplish: lvs. broad-ovate to ovate, acute or obtuse, rounded or broad-cuneate at base, 2–5 cm. long, at first tomentose beneath, soon glabrous; petioles 3–10 mm. long: fls. white, 1–1.2 cm. across, in many-fld. usually loose glabrous corymbs; calyx glabrous: fr. subglobose or obovoid, 8 mm. across, red. Fl.v; fr.viii. R.H.1892:327; 1893:29. B.S.1:413,t(h). G.W.6:62(h). S.L.166(h). (*C. reflexa* Carr.) W. Asia to W. China. Intr. 1837. Zone V.—Var. **calocárpa** Rehd. & Wils. Lvs. larger and narrower: fr. larger, about 1 cm. across, very freely produced. W. China. Intr. 1900.—Var. **granaténsis** Wenzig. Lvs. more pubescent: infl. laxer and more pubescent. Spain. Cult. 1854. Zone VI?—Graceful shrub handsome in bloom; the var. *calocarpa* with ornamental fr.

22. **C. hupehénsis** Rehd. & Wils. Shrub to 2 m., with spreading and arching brs., pubescent at first, soon glabrous and purple: lvs. elliptic to ovate, obtuse or acute, mucronulate, usually rounded at base, 1.5–3.5 cm. long, glabrous above, thinly grayish tomentose beneath; petioles 2–5 mm. long, pubescent: fls. about 1 cm. across, in 6–12-fld. pubescent corymbs; calyx villous; anthers yellow: fr. subglobose, about 8 mm. across, bright red; nutlets 2, the hypostyle covering only the apex. Fl.v; fr.viii-ix. B.C.2:866. Gn.M.29:225(h). C. and W. China. Intr. 1907. Zone V.—One of the handsomest species with the long arching brs. densely studded with clusters of white flowers in May, followed by bright red frs. in August; the lvs. turning yellow.

23. **C. racemiflòra** K. Koch. Shrub to 2.5 m. with slender spreading rarely upright brs.; brts. gray-tomentose while young: lvs. suborbicular to orbicular-obovate or oval, rarely ovate, usually obtuse and mucronate, sometimes emarginate, rarely elliptic and acute at ends, 1.5–3 cm. long, glabrous above, grayish or whitish tomentose beneath: fls. 8 mm. across, in 3–12-fld. short-stalked tomentulose cymes: fr. subglobose, about 8 mm. across, red; stones

2. Fl.v–vi; fr.ix–x. R.H.1867:31. S.H.1:f.424e-k,425d-f. (*C. nummularia* Fisch. & Mey., *C. Fontanesii* Spach.) S. Eu., N. Afr., W. Asia to Himal. and Turkest. Cult. 1829. Zone V.—A very variable species; the typical form var. **Desfontainèsi** Zabel (var. *typica* Schneid.) has generally elliptic acutish lvs., while var. **nummulària** Dipp. (var. *Meyeri* Zab.) has broader usually obtuse lvs.—Var. **songàrica** Schneid. Lvs. oval, usually obtuse and mucronate, less densely pubescent. Gn.M.33:38. W.A.114,t(h). (*C. Fontanesii* var. *s.* Reg.) Song., W. China. Intr. 1910. Zone V.—Var. **microcárpa** Rehd. & Wils. Similar to the preceding; lvs. smaller, 1–1.5 cm. long, fr. ellipsoidal, about 6 mm. long. W. China. Intr. 1910.—Var. **Veïtchii** Rehd. & Wils. Lvs. generally elliptic, acute at ends, 2–3.5 cm. long; fls. 1.2–1.5 cm. across: fr. dark red, about 1 cm. across; nutlet usually 1. M.G.29:6. C. China. Intr. 1900.—Var. **Royleana** Dipp. Low shrub: lvs. suborbicular or broad-obovate, rounded or emarginate at apex, 8–20 mm. long: infl. 3–6-fld. (*C. r.* var. *Kotschyi* Schneid., var. *orbicularis* Dipp., not Wenzig, *C. nevadensis* Hort., *C. Royleana* Hort.) Mediterr. Reg., ? Himal.

Related species are: **C. hebephýlla** Diels with subcoriaceous lvs. S. W. China. Intr. 1913?—**C. Lindleÿi** Steud. Lvs. 2–6 cm. long, sparingly hairy above while young: fr. black. subglobose. Himal. Intr. 1824. Zone VI?

24. **C. frígida** Wall. Tall shrub or small tree to 6 m.; brts. pubescent at first, soon glabrous: lvs. elliptic to elliptic-oblong or oblong-obovate, obtuse or sometimes acute, cuneate, 6–12 cm. long, dull green and glabrous above, paler beneath and tomentose while young, finally usually glabrous; petioles 3–8 mm. long, pubescent: fls. 8 mm. across, in dense tomentose corymbs 4–6 cm. across; sepals triangular, acute: fr. broad-ellipsoidal, about 5 mm. long, bright red; nutlets 2. Fl.vi; fr.viii–ix. B.R.1229(c). L.B.1512(c). Gn.87:28. G.C.III.72:365. M.A.t.6(c),37(h). Himal. Intr. 1824. Zone VII or VIII.—Tall handsome shrub, very striking in autumn and early winter with its large clusters of bright red frs.

A closely related species is **C. affînis** Lindl. Tall shrub: lvs. elliptic to oblong-obovate, acute or sometimes obtuse, 3–8 cm. long, pubescent or tomentose beneath, finally glabrous: fr. subglobose, purple-brown or nearly black. L.B.1522(c). S.H. 1:f.426b-e,427a-f. Himal. Intr. 1828. Zone VII.—Var. **bacillàris** Schneid. Lvs. slightly pubescent at first, soon glabrous: young brts. and infl. slightly pubescent. G.C.III.56:412,t(c). (*C. bacillaris* Wall.) Himal.

25. **C. pannòsa** Franch. Half-evergreen shrub to 2 m., with slender arching brs.; young brts. densely pubescent at first: lvs. elliptic, acute at ends, mucronate, 1–2.5 cm. long, dull green above and glabrous, white-tomentose beneath; petioles 2–7 mm. long: fls. 8 mm. across, in rather dense 6–20-fld. corymbs 1.5–4 cm. across, densely pubescent; sepals triangular, mucronate; anthers purple: fr. globose to ellipsoidal, 6 mm. long, dull red; nutlets 2. Fl.vi; fr.x–xi. B.M.8594(c). Gt.55:t.1551,f.2(c). R.H.1907:256,t(c). Gn.67:118;80:66. S. W. China. Intr. 1886 or 1888. Zone VII or VIII.—Graceful shrub similar to *C. Francheti*, but easily distinguished without fls. by the lvs. being glabrous above, by the slenderer petioles and the smaller fr. with 2 nutlets.

Related species are: **C. Harroviàna** Wils. Lvs. elliptic to elliptic-oblong, 2.5–5 cm. long, densely villous beneath, finally glabrescent, with 5–10 not very prominent veins, leathery: infl. 3–4 cm. across. W. China. Intr. 1900.—**C. oligocárpa** Schneid. Lvs. oval or obovate to elliptic, acute or obtuse, 2.5–5 cm. long, dull and slightly pubescent above, with persistent tomentum beneath: fr. red, obovoid, 4–5 mm. long. W. China. Intr. 1915.—**C. turbinàta** Craib. Lvs. oblong-ovate to oblong-lanceolate, acute at ends, 3–4.5 cm. long, mucronulate: infl. white-tomentose: fr. turbinate, 4–5 mm. long, thinly silky, bright red. Fl.vii. B.M.8546(c). C. China. Intr. 1897.—**C. serótina** Hutchins. Lvs. elliptic to elliptic-obovate, 4–7 cm. long, becoming glabrescent beneath, scarcely glaucous:

infl. 5–7 cm. across: fr. globose, glabrous. Fl.VII. B.M.8854(c). W. China. Cult. 1918.—**C. glaucophýlla** Franch. Lvs. elliptic to elliptic-oblong, 3–6 cm. long, glaucous beneath, glabrous or slightly pubescent at first: infl. slightly pubescent at first; fr. obovoid, 5 mm. long. W. China. Cult. 1915.

26. **C. salicifòlia** Franch. Half-evergreen or evergreen shrub, to 5 m., with spreading brs.; young brts. floccose-tomentose: lvs. elliptic-oblong to ovate-lanceolate, acute or acuminate, cuneate, 3–8 cm. long, rugose and glabrous above, tomentose and glaucous beneath and with 5–12 pairs of prominent veins; petiole 2–5 mm. long, like the midrib often reddish: fls. small, in densely woolly corymbs 3–5 cm. across; anthers red: fr. subglobose, 5 mm. across, bright red, with 2–3 nutlets; hypostyle glabrous. Fl.VI; fr.X. B.M.8999(c). Gn.86:658. W. China. Intr. 1908. Zone VI?—Var. **floccòsa** Rehd. & Wils. Lvs. oblong to oblong-lanceolate, tomentose beneath while young, later partly glabrous, lustrous above, with 7–14 pairs of veins: fr. 6 mm. long, usually with 3 nutlets. G.C.III.71:114. Intr. 1908. Zone (V).—Var. **rugòsa** Rehd. & Wils. Lvs. elliptic-oblong, to 2.5 cm. broad, dull green above, beneath with dense woolly tomentum: fr. 6 mm. long, nutlets 3. B.M.8649(c). G.C.III.56:412,t(c). Gn.87:42. (*C. r.* Pritz.) C. China. Intr. 1907.—Graceful shrub with half-evergreen or in milder climates evergreen lvs. and attractive bright red fr. in late autumn.

Closely related species are: **C. rhytidophýlla** Rehd. & Wils. Brts. and lvs. beneath densely whitish or yellowish tomentose: lvs. oblong-ovate to oblong-lanceolate, 3–8 cm. long, strongly wrinkled above, reticulate beneath: corymbs dense, about 3 cm. across: fr. orange-red, pyriform, about 6 mm. long; stones 3 or 4. W. China. Intr. 1908. Zone VIII or VII?—**C. glabrata** Rehd. & Wils. Young brts. thinly pubescent, soon glabrous and red-brown: lvs. oblong-lanceolate, 4–8 cm. long, bright green and slightly rugose above, glaucous beneath and glabrous or slightly pubescent: corymbs dense, about 3 cm. across, slightly pubescent; styles 2. W. China. Intr. 1908. Zone VII or VIII?

27. **C. Henryàna** Rehd. & Wils. Half-evergreen shrub, to 4 m., with pendulous pubescent brts.: lvs. oblong to oblong-lanceolate, acute at ends, 5–12 cm. long, sparingly pubescent above at first, grayish tomentose beneath, finally often glabrescent or pubescent only on the veins and otherwise nearly glabrous and glaucous, with 9–12 pairs of veins; petiole 5–1.5 mm. long, pubescent: fls. 1 cm. across, in rather loose pubescent corymbs 5–6 cm. across; anthers purple: fr. ovoid, 6 mm. long, dark crimson, with 2–3 nutlets; hypostyle pubescent. Fl.VI; fr.X. G.C.III.46:339. R.H.1919:264,t(c). M.G.29: 15. (*C. rugosa* var. *H.* Schneid.) C. China. Intr. 1901. Zone VII?—Handsome shrub with larger lvs. than any other half-evergreen or evergreen species.

28. **C. Dâmmeri** Schneid. Evergreen shrub with trailing often rooting brs.; brts. slightly pubescent when young, soon glabrous: lvs. elliptic to elliptic-oblong, acutish or obtusish, mucronulate, rarely emarginate, cuneate, 1.5–3 cm. long, glabrous and lustrous dark green above, paler or glaucescent and slightly reticulate beneath, strigose pubescent at first, soon glabrous; petiole 2–3 mm. long: fls. usually solitary, 1 cm. across, short-stalked; calyx sparingly pubescent or nearly glabrous; anthers purple: fr. subglobose 6–7 mm. across, bright red; nutlets usually 5. Fl.V–VI; fr.X–XI. S.H.1:f.428a-b, 429h-k. Gs.5:110. Gt.73:135(h). (*C. humifusa* Duthie.) C. China. Intr. 1900. Zone V?—Var. **radicans** Schneid. Lvs. oval or elliptic to obovate, usually obtuse, often emarginate, more rugulose above, smaller: fls. 1–2, on pedicels 5–15 mm. long. Gn.88:35(h);87:27(h);89:226(h). W. China. Intr. 1904 or 1908.—Evergreen species very distinct on account of its prostrate habit with long rooting brs.

29. **C. prostràta** Baker. Evergreen shrub to 4 m., with long arching stems: lvs. broad-oval or broad-obovate, rounded or acute and mucronulate at apex, usually broad-cuneate, 8–20 mm. long, lustrous dark green above, glaucescent and sparingly strigose-hirsute below: fls. 1–3, 1–1.2 cm. across, short-stalked; calyx sparingly pubescent; anthers purple: fr. subglobose, 8 mm. across, red; nutlets 2. Fl.vi; fr.ix. Ref. Bot. 1:t.53(c). B.R.1187(c). (*C. rotundifolia* Loud., not Wall., *C. microphylla* var. *uva-ursi* Lindl.) Himal. Intr. 1825. Zone VI?—Var. **lanàta** Schneid. Lvs. elliptic to elliptic-oblong, tomentose beneath; fls. 3–8. Ref. Bot.1:t.52(c). R.H.1889:348,t,f.4(c). Gn.55:186;87: 28. (*C. buxifolia* Baker, not Wall., *C. Wheeleri* Hort., in part.)—A handsome evergreen species forming dense low masses.

A related species is **C. buxifòlia** Wall. Lvs. elliptic to obovate, 6–15 mm. long, tomentose below, not papillose: fls. in few-fld. corymbs. Wight, Icon.3:t.992. S.H.1:f.429b,425k-k¹. Nilghiri Hills. Intr. 1824. Zone VIII?—Var. **vellaèa** Franch. Procumbent shrub: lvs. 5–10 mm. long, pubescent above when young: fls. often solitary. W. China. Intr. about 1915. Zone (V).

30. **C. microphýlla** Wall. Evergreen low shrub to 1 m. with spreading brs.: lvs. obovate to obovate-oblong, obtuse, rarely acutish or emarginate, cuneate, 5–8 mm. long, lustrous dark green above, densely grayish pubescent beneath: fls. usually solitary, rarely 2–3, 1 cm. across; calyx pubescent; stamens purple: fr. globose, 6 mm. across, scarlet. Fl.v–vi; fr.ix–x. B.R. 1114(c). R.H.1889:348,t,f.3(c). G.C.II.12:333;18:681. Gn.4:165. Jour. Intern. Gard. Club,2:83(h). Himal. Intr. 1824. Zone (V).—Var. **thymifòlia** Koehne. Lvs. narrowly oblong-obovate; fls. 2–4, smaller: fr. 5 mm. across Ref. Bot.1:t.50(c). R.H.1889:348,t.f.2(c). G.C.II.12:333;18:681. (*C. t* Baker.) Himal. Intr. 1852.—Var. **glaciàlis** Hook. Low compact shrub: lvs obovate or oval, sparingly pubescent beneath, finally glabrous: fls. 6 mm. across, pinkish white: fr. 6 mm. across, bright red. Ref. Bot.1:t.51(c). (*C. congesta* Baker.) Himal. Intr. 1868.—A handsome evergreen species forming dense masses with small lustrous lvs. studded in spring with white fls. followed in autumn by conspicuous scarlet fr.

14. **PYRACÁNTHA** Roem. Firethorn. Evergreen shrubs with usually thorny brs.; buds small, pubescent: lvs. alternate, short-petioled, crenulate or serrulate or entire, stipules minute, caducous: fls. white in compound corymbs; sepals short; petals suborbicular, spreading; stamens 20; anthers yellow; carpels 5, free on the ventral side, on the dorsal one adnate about ½ to the calyx-tube: fr. a small pome with persistent calyx, red or orange; nutlets 5. (Greek *pyr*, fire and *acanthos*, thorn; alluding to the spiny brs. and bright red fr.) Six species from S. E. Eu. to Himal. and C. China.

A. Lvs. beneath and calyx glabrous.
  B. Corymbs pubescent: lvs. elliptic to oblanceolate, acute.....1. *P. coccinea*
  BB. Corymbs glabrous.
    C. Lvs. oblong to oblong-lanceolate, rarely oblong-obovate, usually acute, bristle-tipped serrate-crenate, 1–2 cm. broad.....2. *C. crenulata*
    CC. Lvs. generally obovate to obovate-oblong, obtuse, crenate, 1.5–2.5 cm. broad. 3. *C. Gibbsii*
AA. Lvs. beneath and calyx tomentose, entire or nearly so.....4. *C. angustifolia*

1. **C. coccínea** Roem. Shrub to 2 m., rarely to 6 m.; spines 1–1.5 cm. long; young brts. grayish pubescent: lvs. narrow-elliptic to lanceolate or oblanceolate, rarely ovate-oblong, acute, rarely obtusish, cuneate, 2–4 cm. long, closely crenulate-serrulate, slightly pubescent beneath at first or glabrous; petioles 2–5 mm. long, pubescent: fls. 8 mm. across, in many-fld. corymbs 2.5–4 cm. broad: fr. subglobose, 5–6 mm. thick, bright red. Fl.v–vi; fr.ix–x. S.O.2:t.90(c). R.I.25:t.99(c). B.S.2:268. M.D.1917:t.32(h). (*Cotoneaster*

Pyracantha Spach, *Crataegus P.* Borkh., *Mespilus P.* L.—Fiery Thorn, Everlasting Thorn.) Italy to W. Asia. Intr. 1629. Zone VI or VII.—Var. **Lalándii** Dipp. Of more vigorous growth with slenderer and longer brs.: lvs. less deeply crenate: fr. bright orange-red. R.H.1925:572,t,f.2(c). Gn.79:570; 89:614. M.G.16:136(h). (*P. c.* var. *latifolia* Zabel.) Orig. about 1874.—A very ornamental evergreen shrub doing particularly well trained against a wall; the var. is more vigorous and hardier.

2. **P. crenulàta** Roem. Shrub or small tree; young brts. and petioles rusty-pubescent: lvs. oblong to oblanceolate, rarely ovate-lanceolate, acute or obtusish and bristle-tipped at apex, cuneate, 2–5 cm. long, crenate-serrulate, lustrous bright green above, glabrous; petioles glabrous: fls. 8 mm. across, in rather loose corymbs 2–3 cm. broad; styles spreading from the base: fr. subglobose, 6–8 mm. across, orange-red. Fl.v–vi; fr.ix–x. B.R.30:52(c). G.C. III.57:101,t(c). R.H.1913:205,t(c). S.H.1:f.430c-d,413g-h. (*Crataegus c.* Roxb., *Cotoneaster c.* Wenzig.) Himal. Intr. about 1844. Zone VIII?—Var. **Rogersiàna** A. B. Jacks. Lower: lvs. oblanceolate, 2–4.5 cm. long, unequally serrulate: fr. 7–8 mm. across, reddish orange. R.H.1925:572,t.f.3(c). G.C. III.60:309(l). Gn.85:567. S. W. China. Intr. 1911.—Var. **flàva** Gard. Chron. A form of the preceding var. with yellow fr. R.H.1925:572,t,f.1(c). G.C.III. 67:55.—Var. **kansuénsis** Rehd. Lvs. narrow-oblong to oblanceolate, 1–2.5 cm. long: infl. pubescent: fr. about 5 mm. across. N. W. China. Intr. 1914.

3. **P. Gíbbsii** A. B. Jacks. Shrub to 3 m.; young brts. rusty-pubescent: lvs. elliptic or obovate to obovate-oblong, rounded or acute at apex, sometimes with a minute mucro, 2.5–6 cm. long, crenate, entire and gradually narrowed toward the base, dark green and lustrous above, light green beneath: fls. 1 cm. across; infl. 3–4 cm. across: fr. subglobose, 7 mm. across, coral-red. Fl.v–vii; fr.x–i. R.H.1813:204,t,B(c). Gn.83:138;87:52. G.C. III.60:309;63:47(h);73:23. (Var. *yunnanensis* Osborn, *C. crenulata* var. *yunnanensis* Mottet.) C. and W. China. Intr. 1907. Zone VII?—More vigorous and more freely fruiting than the preceding species and possibly hardier.

The closely related **P. díscolor** Rehd. with entire or nearly entire generally oblong lvs. more abruptly cuneate and sometimes nearly rounded at base, glaucescent or pale beneath, from C. China, is probably not in cult.

4. **P. angustifòlia** Schneid. Shrub to 4 m., sometimes prostrate: lvs. narrow-oblong to oblanceolate-oblong, obtuse and mucronulate, sometimes emarginate, cuneate, 1.5–5 cm. long, entire or with few teeth near apex, pubescent above at first, finally glabrous and dark green, grayish tomentose beneath: fls. 8 mm. across, in rather dense corymbs 2–4 cm. across: fr. globose, 6–8 mm. across, short-stalked, bright orange to brick-red. Fl.v–vi; fr.x–iii. B.M.8345(c). Gn.67:24, 105,t(c);87:110. G.C.III.36:441. (*Cotoneaster a.* Franch.) S. W. China. Intr. 1895. Zone VIII.—Very handsome, retaining its bright-colored fr. until March.

15. **MÉSPILUS** L. Medlar. Deciduous tree, sometimes thorny; buds with imbricate scales, dark brown: lvs. alternate, short-petioled, serrulate or nearly entire, with deciduous stipules: fls. solitary, large, white, on short, not articulate stalks, terminal on short leafy brts.; sepals large; petals suborbicular or broad-obovate; stamens 30–40, with red anthers; styles 5 distinct, glabrous; carpels 5, completely connate, each with 2 fertile ovules: fr. a large pomaceous drupe, open at the top, with large leafy sepals, stones 5. (Ancient Latin name.) One species.

M. germànica L. Shrub or small tree, to 5 m. or more; brts. pubescent: lvs. oblong to oblong-lanceolate, short-acuminate, 6–12 cm. long, slightly pubescent and dull green above, more densely pubescent beneath: fls. 3–4 cm. across: fr. depressed-subglobose or pyriform, 2–3 cm. across. Fl.v; fr.x–xi. S.O.2:t.83(c). G.H.t.69(c). S.E.3:t.478(c). R.I.25:t.100(c). S. E. Eu. to Persia, doubtfully native in C. Eu. and Eng. Long cult. Zone V.—Var. **gigantèa** Kirchn., with larger, much depressed fr. (Var. *macrocarpa* Koch.) Var. **abortìva** K. Koch, a seedless form with small fr. (Var. *apyrena* K. Koch.) There are also forms with variegated lvs.—Sometimes grown for its fr. which after incipient decay becomes soft and of agreeable acid taste.

M. g. × *Crataegus Oxyacantha* = *Crataego-mespilus grandiflora;* see below.—*M. g.* × *Crataegus monogyna* = *C. Gillotii;* see below.

× **CRATAEGOMÉSPILUS** Jouin. Deciduous trees or shrubs: graft-hybrids or sexual hybrids (*Cratae-mespilus* Camus) between *Crataegus* and *Mespilus*: similar to Mespilus but differing in the smaller fls., usually 1–3 at end of brts., with 14–28 stamens and in the smaller fr. with 2–3 sterile nutlets.

C. grandiflòra Bean (*Crataegus Oxyacantha* × *Mespilus germanica*). Shrub or tree: lvs. elliptic, acute at ends, 3–7 cm. long, unequally serrate or serrulate, or sometimes slightly lobed toward the apex, pubescent beneath: fls. 1–3, about 2.5 cm. across; calyx pubescent: fr. globose-ovoid 1–1.5 cm. across, pubescent. Fl.v–vi; fr.x. B.M.3442(c). R.I.25:t.107,f.4–9(c). G.F.10:35. R.H.1869:80. (*Crataegus g.* K. Koch, *C. Smithii* Ser., *C. lobata* Bosc, *Mespilus g.* Smith, *Cratae-mespilus g.* Camus.) Orig. before 1800. Zone V.

A similar hybrid is **C. Gillòtii** Beck (*Crataegus monogyna* × *M. germanica*), differing chiefly in its lobed, not serrate lvs. and smaller fls. with 2 styles. R.I.25:t.107,f.1–3(c). Orig. in France. Cult. 1890.

C. Dárdari Jouin (Graft-hybrid between *Crataegus monogyna* and *M. germanica*). Lvs. and fr. similar to those of Mespilus, but brs. spiny: fls. 1.5 cm. across, in corymbs, pedicelled; stamens 15–20: fr. 1.5 cm. across, crowned by the upright calyx-lobes; stones 1–3. R.I.25:t.108(c). M.G.27:101. Kew Bull.1911:268,t.—Var. **Asnierèsii** Rehd. Resembling *Crataegus monogyna*, but pubescent: lvs. broad-obovate to ovate, serrulate and usually with 1 to 2 pairs of lobes: fls. in 3–12-fld. corymbs; stamens 20; styles 1–2: fr. subglobose, 1 cm. across. R.I.25:t.109(c). G.C.III.50:183, 185;77:3(h). Gn.75:310;86:189(h). Kew Bull.1911:268,t(h). (C. "Jules d'Asnières" Jouin, *C. Asnieresii* Schneid.)—Both forms orig. on the same tree at Bronveaux near Metz, France. The var. with slender arching brs. is handsomer than the type. Sometimes brs. reverting to one of the parents are produced.

16. **CRATAÈGUS** L. Haw. Deciduous, rarely half-evergreen shrubs or small trees, usually spiny: lvs. alternate, serrate or lobed, stipulate: fls. white (red in some vars.), in corymbs, rarely solitary: sepals and petals 5; stamens 5–25; carpels 1–5, connate, but free at the apex and on the ventral side: fr. a pome-like drupe with 1–5 bony 1-seeded nutlets, their free part (hypostyle) differing in texture. (Ancient Greek name.) Temp. regions of the n. hemisphere; about 800 species distinguished in N. Am. and 90 in the Old World.—Of the American species a large number has been intr. (about 600 growing in the Arnold Arboretum). As it would exceed the limits of this book to treat all of them fully here, only some representative species of the different groups are described; for other American species see Sargent, Man. Trees N. Am., ed.2,397–549, Small, Fl. S. E. St.532–569, Gray's Man.ed.7,460–479, and

Britton & Brown, Ill. Fl. ed.2,2:294–321; also Palmer in Jour. Arnold Arb. 6:5–128 for a complete enumeration of all American species.

A. Veins of the lvs. extending to the points of the lobes or teeth only: lvs. usually slightly or not lobed (except in Nos. 32–34): fr. not blue or black (except in Nos. 20 and 31).
B. Stones without cavities on the inner surface: fr. usually mealy at maturity.
C. Petioles elongated, usually slender.
D. Petioles glandular at apex or sparingly glandular throughout.
E. Petioles glandular only at apex; corymbs many-fld.: lvs. broad at base.
F. Lvs. tomentose or pubescent beneath, at least on the veins.
G. Stamens 20: lvs. leathery ..... 1. *C. mollis*
GG. Stamens 10; lvs. membranous ..... 2. *C. submollis*
FF. Lvs. glabrous beneath or nearly so.
G. Fr. not bloomy.
H. Stamens 20; anthers pink; infl. glabrous: lvs. truncate. 4. *C. coccinioides*
HH. Stamens 5–10: lvs. broad-cuneate to truncate.
I. Anthers pink or rose-colored; stamens usually 10.
J. Calyx-lobes usually glandular-serrate: nutlets usually 4.
K. Infl. densely villous ..... 3. *Ellwangeriana*
KK. Infl. slightly villous or glabrous ..... 5. *C. pedicellata*
JJ. Calyx-lobes entire or obscurely serrate; nutlets 2–3. 6. *C. flabellata*
II. Anthers yellow; stamens 5–10 ..... 7. *C. rotundifolia*
GG. Fr. bloomy until nearly fully ripe ..... 8. *C. pruinosa*
EE. Petioles sparingly glandular throughout; corymbs usually few-fld.: lvs. cuneate at base: stamens 10.
F. Infl. glabrous or nearly so ..... 9. *C. intricata*
FF. Infl. pubescent.
G. Corymbs many-fld ..... 10. *C. Harbisonii*
GG. Corymbs 2–5-fld ..... 11. *C. triflora*
DD. Petioles glandless or with few minute glands: lvs. usually 3-lobed toward the apex, lustrous above.
E. Fr. bright red ..... 12. *C. viridis*
EE. Fr. dull dark red ..... 13. *C. nitida*
CC. Petioles usually short (except in No. 21): lvs. cuneate at base, not or very slightly lobed.
D. Infl. many-fld.
E. Fr. red.
F. Stamens 10; corymbs glabrous ..... 14. *C. crus-galli*
FF. Stamens 15–20.
G. Lvs. lustrous above.
H. Nutlets 1–3: lvs. 6–10 cm. long.
I. Lvs. glabrous beneath ..... 15. *C. persistens*
II. Lvs. villous beneath ..... 16. *C. Lavallei*
HH. Nutlets 3–5; lvs. 1–6 cm. long.
I. Fr. 1–1.5 cm. across: anthers red: lvs. pubescent ..... 17. *C. cuneata*
II. Fr. 4–6 mm. across: anthers yellow: lvs. glabrous ..... 25. *C. spathulata*
GG. Lvs. dull above.
H. Fr. juicy, edible: lvs. cuneate-oblong to elliptic-lanceolate, tomentose beneath ..... 18. *C. pubescens*
HH. Fr. dry, mealy: lvs. obovate or oval ..... 19. *C. punctata*
EE. Fr. bluish black ..... 20. *C. brachyacantha*
DD. Infl. 1–5-fld.: lvs. not exceeding 5 cm.
E. Petioles glandless or with few glands.
F. Fls. before the lvs., 2–5; sepals entire or minutely serrate; petioles 6–20 mm. long ..... 21. *C. aestivalis*
FF. Fls. after the lvs., usually solitary; sepals foliaceous, glandular-serrate; petioles short ..... 22. *C. uniflora*
EE. Petioles, margin of lf. and infl. densely glandular ..... 23. *C. aprica*
BB. Nutlets with furrows or irregular cavities on the inner surface: fr. usually lustrous and pulpy at maturity.
C. Lvs. not or only slightly lobed.
D. Fr. scarlet or orange; stones 2–3.
E. Nutlets with shallow cavities: lvs. glabrous or nearly so: stamens 10–15. 27. *C. scabrida*
EE. Nutlets with deep cavities: lvs. with impressed veins.
F. Fr. ellipsoid or pear-shaped, upright: lvs. elliptic to oblong, pubescent below: stamens 20 ..... 28. *C. tomentosa*
FF. Fr. subglobose, nodding: lvs. broad-elliptic, pubescent only on the veins beneath.
G. Stamens usually 20; anthers rose-colored ..... 29. *C. succulenta*
GG. Stamens usually 10; anthers yellow ..... 30. *C. macracantha*
DD. Fr. black; nutlets 3–5: lvs. glabrous ..... 31. *C. Douglasii*
CC. Lvs. distinctly lobed and sharply serrate.
D. Fr. black ..... 32. *C. chlorosarca*
DD. Fr. red or yellow.
E. Lvs. cuneate, often pubescent; petioles stout: anthers pink or purple. 33. *C. sanguinea*

EE. Lvs. truncate to broad-cuneate, glabrous; petioles slender: anthers pale yellow: fr. yellow or yellowish red.....34. *C. Wattiana*
AA. Veins of lvs. extending to the points of the lobes and to the sinuses, at least on the larger leaves: fr. red or yellow (black in Nos. 35–36).
B. Fr. 4–7 mm. across; sepals often deciduous.
C. Lvs. triangular-ovate, 3–5-lobed, with broad-ovate lobes: fr. subglobose; calyx deciduous.....26. *C. Phaenopyrum*
CC. Lvs. ovate, deeply 5–7-lobed: fr. ellipsoid.....24. *C. apiifolia*
BB. Fr. larger; sepals persistent.
C. Fr. black; stones with cavities on the inner surface.
D. Lvs. with about 5 pairs of lobes; anthers yellow: fr. lustrous, subglobose. 35. *C. nigra*
DD. Lvs. with 2–3 pairs of lobes: anthers red: fr. dull, ellipsoid.....36. *C. pentagyna*
CC. Fr. red or yellow.
D. Stones 1–2, rarely 3, with cavities on the inner surface.
E. Styles usually 2: lvs. 3–5-lobed with short and broad serrulate lobes. 37. *C. Oxyacantha*
EE. Style usually 1: lvs. deeply 3–7-lobed, with usually entire or sparingly toothed lobes.....38. *C. monogyna*
DD. Stones 2–5, without cavities.
E. Brts. pubescent.
F. Lvs. not glandular-serrate; lobes often entire.
G. Lvs. lustrous above and glabrescent, finely pubescent below. 39. *C. Azarolus*
GG. Lvs. dull and pubescent above, villous beneath: stones 4–5.40. *C. orientalis*
FF. Lvs. with glandular-serrate lobes, pubescent.....41. *C. tanacetifolia*
EE. Brts. glabrous: lvs. deeply lobed, glabrous.....42. *C. pinnatifida*

Group 1. Molles Sarg.

1. **C. mollis** Scheele. Tree to 10 m., with short stout thorns: lvs. broad-ovate, 6–10 cm. long, sharply and doubly serrate and with 4–5 pairs of short and acute lobes, densely pubescent beneath at first, later chiefly on the veins: infl. tomentulose; fls. 2.5 cm. across, with red disk: fr. usually pear-shaped, 1.2 cm. across, scarlet, pubescent, with sweet mealy flesh; nutlets 4–5. Fl. IV–V; fr. VIII–IX. S.S.13:t.659. (*C. tiliaefolia* K. Koch, *C. acerifolia* Hort., *C. coccinea* var. *m.* Torr. & Gray.) Ohio to S. D. and Kans. Cult. 1870. Zone IV.—This and the following species of this group are handsome small trees with bright green foliage, large white flowers and brightly colored rather large fr. in autumn.

A closely related species is **C. arkansana** Sarg. with generally oblong-ovate lvs. and frs. ripening in Oct. S.S.13:t.660. Ark. Intr. 1883.—Another related species of unknown origin, probably from W. Asia is **C. peregrina** Sarg. Lvs. ovate, broad-cuneate, with 4–6 pairs of narrow lobes, glabrous above, villous beneath: fr. ovoid-globose, dark dull purple, pubescent at base and apex. S.T.2:t.191. Intr. 1873.

2. **C. submóllis** Sarg. Tree to 8 m., with broad round head; spines thin, usually straight, 5–7 cm. long: lvs. ovate, acute, broadly cuneate, 5–8 cm. long, doubly serrate and with 3–4 pairs of acute short lobes, scabrous above, soft-pubescent beneath at first, later puberulous on the veins: infl. tomentose: fls. 2.5 cm. across: fr. pear-shaped or broad-ellipsoid, 1.8 cm. long, bright orange-red and lustrous, puberulous at base, with yellow mealy flesh; nutlets usually 5. Fl. V; fr. early in Sept., soon falling. S.S.4:t.182 (as *C. mollis*). Em.494,t.(as *C. tomentosa*). G.F.5:221(h). Que. to Mass. and e. N. Y. Cult. 1830. Zone IV.

A closely related species is **C. arnoldiàna** Sarg. Brs. zigzag; lvs. often truncate at base, smooth and lustrous above; fr. subglobose, villous toward the ends; nutlets 3–4. S.S.13:t.668. B.C.2:882. Mass. to Conn. and N. Y. Cult. 1900.

3. **C. Ellwangeriàna** Sarg. Tree, sometimes to 6 m. with ascending brs. forming a broad symmetrical head: lvs. oval or ovate, acute, broad-cuneate or rounded, 6–9 cm. long, coarsely and often doubly serrate, with many short acute lobes, at first hairy above and villous below, later scabrous above

and nearly glabrous below: infl. many-fld., villous; pedicels short; fls. 2.5 cm. across: fr. short-ellipsoid, 2.5 cm. long, bright crimson, lustrous, slightly villous at ends, with thin acid flesh; nutlets 3–5. Fl.v; fr. end of Sept., soon falling. S.S.13:t.671. Gn.86:569. G.C.III.47:130(h). A.F.24:325(h). F.E. 33:488(h). Ont. to Mich. and Pa. Cult. 1900. Zone IV.

A closely related species is **C. Robesoniàna** Sarg. Shrub: lvs. more deeply lobed: infl. 4–6-fld., nearly glabrous: fr. ellipsoid, about 2 cm. long, scarlet, pale-dotted. (*C. spissiflora* Sarg.) Ont. to Mass. and Pa. Cult. 1890 (by Ellwanger & Barry as *C. coccinea*). Zone IV.

Group 2. Dilatatae Sarg.

4. **C. coccinioïdes** Ashe. Tree, sometimes to 7 m., with broad round head; thorns stout, 3–5 cm. long: lvs. broad-ovate, acute, rounded or truncate at base, 5–8 cm. long, doubly serrate, with several pairs of broad acute lobes, at first villous on the veins beneath, later nearly glabrous, dull green above: infl. slightly villous, compact, 5–7-fld.; fls. 2 cm. across: fr. subglobose, 1.8 cm. long, dark crimson and lustrous, with thick, subacid flesh; calyx enlarged; nutlets 4–5. Fl.v; fr. early in Oct. S.S.13:674. S.T.1:t.33. B.C.2: 883. M.G.16:358, 359(h). (*C. speciosa* Sarg.) Mo. to Ind. and Kans. Intr. 1883. Zone V.—Small round-headed tree conspicuous in fl. and in fr., the lvs. tinged red when unfolding and turning orange and scarlet in autumn.

A related species is **C. durobrivénsis** Sarg. Shrub to 6 m.: lvs. broad-cuneate at base, glabrous: infl. glabrous; fls. 2–2.5 cm. across: fr. globose, 1.6 cm. thick. S.T.1:t.2. Gn.M.33:104(h). N. Y. Intr. 1901.

Group 3. Coccineae Loud.

5. **C. pedicellàta** Sarg. Small tree to 7 m., with round symmetrical head; brs. rather slender, with straight or slightly curved thorns 3–5 cm. long: lvs. broad-ovate, truncate or broad-cuneate, 5–10 cm. long, coarsely and often doubly serrate, with 4–5 pairs of short acute lobes above the middle, dark green and scabrous above, paler and nearly glabrous below: infl. slightly villous, loose; fls. 1.5–2 cm. across; sepals coarsely glandular-serrate; anthers rose-colored: fr. pear-shaped or ellipsoidal, bright scarlet and lustrous, with conspicuous calyx; flesh thin, mealy; nutlets 4–5. Fl.v; fr.ix. S.S.13:t.677. Pa. to Conn., N. Y. and Ont. Intr. 1902. Zone IV.—Var. **gloriòsa** Sarg. Fls. larger; anthers pink: fr. larger, more lustrous, usually mamillate at base. Gn.M.33:106(h). (*C. g.* Sarg.) N. Y. Intr. 1906.

Group 4. Tenuifoliae Sarg.

6. **C. flabellàta** K. Koch. Shrub to 6 m., with many ascending stems; thorns stout, slightly curved, 4 or sometimes to 10 cm. long: lvs. ovate to broad-ovate, broad-cuneate to truncate, rarely subcordate, 3–7 cm. long, doubly serrate and sharply lobed with the tips of the lobes often recurved, slightly villous above, later scabrous and glabrate, villous on the veins beneath at first: infl. slightly villous; fls. 1.5–2 cm. across; sepals serrate; stamens 10–20: fr. ellipsoid to subglobose, 1 cm. thick, crimson; nutlets 3–5. Fl.v; fr.ix. Lange, Rev.Crat.29. Que. to N. Y. and Ill. Intr. before 1830. Zone IV or III.

Closely related species are: **C. acutíloba** Sarg. Shrub to 4 m.: lvs. with 4 or 5 pairs of narrow acute or acuminate lobes, glabrous: infl. glabrous; sepals entire; stamens usually 10: fr. obovoid to ellipsoid; nutlets 2–3. B.S.1:424. (*C. coccinea indentata* Hort., not Loud.) S. E. Can. to N. Eng. Cult. 1880.—**C. macrospérma** Ashe. Shrub or small tree to 8 m.: lvs. slightly lobed, rounded or truncate at base: infl. glabrous; sepals entire: fr. short-ellipsoid, 1.3–1.8 cm. thick. Ad.4:t.138(c). N. C. and W. Va. to Ga. and Tenn. Intr. 1903. Zone V.

Group 5. Rotundifoliae Sarg.

7. **C. rotundifòlia** Moench. Shrub or bushy tree, sometimes to 6 m.; thorns slender: lvs. orbicular-ovate to broad-elliptic or obovate, broad-cuneate, 3–5 cm. long, rather coarsely doubly serrate, with 3–4 pairs of short acute lobes, glabrous or pubescent on the veins beneath while young: infl. glabrous or slightly villous; fls. 2 cm. across; sepals and bractlets glandular-serrate: fr. subglobose, 1.2 cm. across, red with yellow sweet flesh; nutlets 2–3. Fl.v; fr.ix. Gray, Man.468. B.R.1957(c). G.C.II.14:557. Gn.22:145; 33:464. (*C. coccinea* var. *r.* Sarg., *C. glandulosa* Ait., *C. Dodgei* Ashe.) N. S. to Sask., s. to Ill. and Va. Cult. 1750. Zone II?

Group 6. Pruinosae Sarg. (including *Silvicolae* Sarg.)

8. **C. pruinòsa** K. Koch. Shrub or tree to 6 m.; brs. spreading, with numerous stout straight thorns: lvs. elliptic or ovate, acute, usually broad-cuneate, 3–5 cm. long, irregularly and often doubly serrate and with 3–4 pairs of short acute lobes, red when unfolding, later dark bluish green above, paler beneath, glabrous: infl. several-fld.; fls. slender-pedicelled, 2–2.5 cm. across; stamens 20; anthers pinkish: fr. subglobose, 1–1.2 cm. thick, apple-green and glaucous until nearly fully ripe, finally dark purple with yellow sweet flesh; the calyx with well-developed tube: nutlets 5. Fl.v; fr.x. S.S. 13:t.648. Vt. to Va. and Ill. Cult. 1823. Zone V.

Group 7. Intricatae Sarg.

9. **C. intricàta** Lge. Shrub to 3 m.; brs. upright or spreading, with long curved thorn: lvs. elliptic-ovate, acute, cuneate, 2–7 cm. long, doubly serrate and with 3–4 pairs of short acute lobes, glabrous above, bright green, slightly paler beneath and nearly glabrous: infl. slightly villous, 3–7-fld., with very glandular deciduous bracts; sepals glandular-serrate; anthers yellow: fr. subglobose to ellipsoid, reddish brown; nutlets 3–4. Fl.v; fr.x. Lange, Rev. Crat.t.1. (*C. coccinea* L., in part.) Mass. to N. Y. and N. C. Intr. before 1890. Zone V.

Group 8. Bracteatae Sarg.

10. **C. Harbisònii** Beadle. Tree to 8 m., with widespreading brs.; thorns usually stout, 3–5 cm. long: lvs. broad-ovate to obovate, acute, rounded or broad-cuneate, 3–10 cm. long, coarsely or incisely serrate; lustrous and scabrate above, pubescent beneath: infl. many-fld., pubescent, with conspicuous glandular bracts; fls. about 2 cm. across; sepals glandular-serrate; stamens 20; anthers yellow: fr. globose, 1.2 cm. across, red; nutlets 3–5. Fl.v; fr.x. S.S.13:t.691. Tenn. Intr. 1900. Zone V.

Group 9. Triflorae Beadle.

11. **C. triflòra** Chapm. Large shrub or tree to 7 m.: lvs. ovate to elliptic, acute, rounded or broad-cuneate, 2–7 cm. long, serrate and with short acute lobes, pubescent: infl. usually 3-fld., pubescent: fls. 2.5–3 cm. across; sepals glandular-serrate, pubescent; stamens 20; anthers yellow: fr. globose, 1.2–1.5 cm. across, pubescent, red; nutlets 3–5. Fl.v–vi; fr.ix–x. Ga., Ala. Intr. 1912. Zone V.

Group 10. Virides Sarg.

12. **C. víridis** L. Tree to 12 m., with spreading brs.; thorns slender: lvs. oblong-ovate to elliptic, acute or acuminate, cuneate, 2–6 cm. long, serrate, dark green and lustrous above, paler beneath, finally glabrous: infl. glabrous;

pedicels slender; sepals lanceolate, entire: fr. globose, 4–6 mm. across, bright red; stones usually 5. Fl.v; fr.x(–III). S.S.4:t.187. (*C. arborescens* Ell.) Md. and Va. to Ill., Iowa, Tex. and Fla. Cult. 1827. Zone V.

13. **C. nítida** Sarg. Tree to 10 m. with spreading brs., unarmed or with straight thorns: lvs. elliptic to oblong-obovate, acuminate, cuneate, 2–8 cm. long, coarsely serrate and often slightly lobed, dark green and lustrous above, paler below, glabrous: infl. glabrous; sepals lanceolate, entire or sparingly glandular-serrate: fr. subglobose or short-ellipsoid, about 1 cm. long, dull red, with yellow mealy flesh; nutlets 2–5. Fl.v; fr.x(–III). S.S.13:t.703. Gray Man.465. Ill. to Mo. and Ark. Intr. 1883. Zone V.—Like the preceding a handsome round-headed tree with lustrous lvs. changing to orange and scarlet in autumn and with red fr. persisting through the winter.

Group 11. Crus-galli Loud.

14. **C. crus-gálli** L. Cockspur Thorn. Large shrub or tree to 12 m., with wide-spreading rigid brs.; thorns slender, numerous: lvs. obovate to oblong-obovate, usually rounded at apex, cuneate, 2–8 cm. long, sharply serrate above the entire base, quite glabrous, subcoriaceous: infl. glabrous; fls. 1.5 cm. across; sepals entire or minutely glandular-serrate: fr. subglobose, about 1 cm. across, red, with thin and dry flesh; nutlets usually 2. Fl.v–VI; fr. late in Oct. R.B.116(c). S.S.4:t.178. Em.492,t. G.F.7:295. G.C.III.28:244, suppl. Que. to N. C., w. to Mich. Intr. 1691. Zone IV.—Var. **salicifólia** Ait. Lvs. lanceolate to oblanceolate, thinner. (Var. *linearis* Ser.)—Var. **pyracanthifólia** Ait. Lvs. elliptic to obovate, usually acute: fr. smaller, bright red. S.S.13:t.637. W. N. Y. and Pa. to Fla. and Tenn.—Var. **spléndens** Ait. Lvs. elliptic-oblanceolate, very shining.—Handsome ornamental tree, attractive in bloom and with very decorative bright red fr. remaining during the winter; the lvs. changing to orange and scarlet in autumn.

C. c. × *pubescens* = *C. Lavallei;* see No. 16.—*C. c.* × ? *macracantha* = *C. pruni-folia;* see under No. 30.—*C. c.* × *pentagyna* = *C. hiemalis;* see under No. 36.

Related species are: **C. Fontanesiána** Steud. Lvs. thinner, elliptic to elliptic-lanceolate, or obovate-oblong: pedicels hairy; stamens 16–18, with yellow anthers: fr. ellipsoid or pyriform, 1.2 cm. long, brick-red. G.O.t.144. (*Mespilus F.* Spach, *C. olivacea* Sarg.) Pa. Cult. 1830. Zone V.—**C. fecúnda** Sarg. Tree to 8 m.: lvs. thinner, ovate or elliptic to oblong-ovate, 5–8 cm. long, acute, rarely rounded at apex, coarsely doubly serrate, slightly pubescent on the veins beneath or nearly glabrous: infl. glabrous or slightly pubescent: fr. subglobose to short-ellipsoid, about 1.5 cm. across. W.A.62,t(h). Mo., Ill. Intr. 1883. Zone V.

15. × **C. persístens** Sarg. Low tree to 4 m. or more, with wide-spreading brs.; thorns stout, to 5 cm. long; young brts. glabrous: lvs. narrow-elliptic to oblong-obovate or oblong, acute or acuminate, cuneate, 5–7 cm. long, serrate from below the middle, dark green and lustrous above, paler beneath, glabrous, subcoriaceous: infl. slightly villous; calyx glabrous; fls. 2 cm. across; sepals glandular-serrate above the middle or entire; stamens 20, with whitish anthers: fr. ellipsoid or slightly pear-shaped, 1.5 cm. long, crimson, not lustrous; stones 2–3. Fl.v; fr.x. S.T.2:t.190. Orig. 1876? (Possibly hybrid of *C. crus-galli.*) Zone V.—Small tree, similar to the Cockspur Thorn, but remaining green into the early winter and very conspicuous with its persistent red fr.

16. × **C. Lavállei** Herincq (? *C. crus-galli* × *pubescens*). Small tree to 7 m., with spreading brs.; spines stout, to 5 cm. long; young brts. pubescent: lvs. elliptic to oblong-obovate, acute, cuneate, 5–10 cm. long, unequally serrate from below the middle, slightly pubescent above when young, finally glabrous and lustrous, pubescent beneath: infl. many-fld., villous: fls. 2 cm. across, with red disk; sepals linear, slightly serrulate; stamens 15–20, with

yellow or red anthers: fr. ellipsoid, about 1.5 cm. long, brick-red or orange-red; stones 2–3. Fl.v; fr.x(–III). R.H.1883:108,t(c);1924:59(h). L.I.t.7. G.C.III.4:737;21:118, 119. M.A.t.31(h). (*C. Carrierei* Vauvel.) Orig. before 1880. Zone V.—Ornamental tree with rather large lvs. turning bronzy red late in autumn, and with conspicuous fls. and showy fr. remaining through the winter.

Group 12. Cuneatae Rehd.

17. **C. cuneàta** Sieb. Much-branched shrub to 1.5 m.; spines slender, 5–8 mm. long; young brts. pubescent: lvs. broad-obovate to obovate-oblong, gradually narrowed into a short petiole, 2–6 cm. long, incisely and irregularly serrate and often 3-lobed at apex, soon glabrous above, loosely villous beneath, at least on the veins; stipules semi-ovate, toothed: fls. 1.5 cm. across, in few-fld. pubescent corymbs; sepals entire or toothed; stamens 20; anthers red: fr. globose or pear-shaped with persistent large reflexed sepals and usually an adnate bract; nutlets 5. Fl.v–VI; fr.x. L.I.t.5. S.H.1:f.453s-v, 454a-c. (*C. alnifolia* Hort., not Sieb. & Zucc., *Mespilus c.* K. Koch.) Japan, China. Cult. 1880. Zone (V).—Small twiggy shrub, of no particular ornamental value.

Group 13. Mexicanae Loud.

18. **C. pubéscens** Steud. f. **stipulàcea** Stapf. Small tree to 10 m., unarmed or with straight spines to 4 cm. long; young brts. tomentose: lvs. elliptic-oblong or elliptic-obovate to oblanceolate, acute, cuneate, 4–8 cm. long, simply or nearly doubly serrate-crenate, sometimes lobed toward the apex, dark green above, pubescent at first, finally glabrous, slightly villous beneath, more densely on the veins; petiole 5–15 mm. long; stipules usually foliaceous, linear to lanceolate: infl. 6–12-fld., rather dense, villous: fls. 2 cm. across; sepals linear-lanceolate, entire or sparingly dentate near apex; stamens 15–20; anthers pink: fr. subglobose or pyriform, to 2.5 cm. thick, greenish yellow or orange; nutlets usually 2–3. Fl.III; fr.x–XI. B.M.8589(c). B.R.t.1910(c). S.B.II.t.300(c). Gn.87:462. (*C. s.* Loud., *C. Loddigesiana* Desf., *C. hypolasia* K. Koch.) Mex. Intr. 1824. Zone VII? or VIII.—The typical **C. pubescens** Steud. (*C. mexicana* DC., *Mespilus p.* HBK.) is probably not in cult.—A tree with rather large lvs. turning orange and red late in autumn and with large edible fr.

C. p. × *crus-galli* = *C. Lavallei;* see No. 16.—*C. p.* × ? = **C. grignonénsis** Mouillef. Lvs. with 2–4 pairs of acutish slightly crenate-serrate lobes: fr. subglobose, about 1.5 cm. thick, bright red. M.A.t.30(h). Orig. before 1870. Zone V.

Group 14. Punctatae Loud.

19. **C. punctàta** Jacq. Tree to 10 m., with horizontally spreading brs.; spines stout, short or wanting; young brts. pubescent at first: lvs. obovate, 5–10 cm. long, obtuse or acute, narrowed at base into a margined petiole to 1.5 cm. long, irregularly serrate, those of the shoots often slightly lobed above the middle, with impressed veins above, villous beneath: infl. villous, many-fld.; fls. 1.5–2 cm. across; sepals nearly entire; stamens 20: fr. subglobose or pyriform, 1.5–2 cm. long, dull red, dotted; nutlets 5. Fl.v–VI; fr. Oct., falling soon. S.S.4:t.184. W.D.57(c). A.F.28:805(h). W.A.60,t(h). Que. to Ont., Ill. and Ga. Intr. 1746. Zone IV.—Var. **aùrea** Ait. Fr. yellow. (Var. *xanthocarpa* Roem., *C. crocata* Roem.) L.I.t.16.

C. p. × *tanacetifolia* = *C. Dippeliana;* see under No. 41.

A related species is **C. collina** Chapm. Lvs. 3–5 cm. long, nearly glabrous: fr. dark red, about 1 cm. across. S.S.13:t.654. Va. to Tenn. and Ala. Cult. 1899. Zone V.

Group 15. Brevispinae Beadle (*Brachyacanthae* Sarg.)

20. **C. brachyacántha** Sarg. & Engelm. Tree to 15 m.; spines curved, 8–15 mm. long: lvs. obovate-oblong to elliptic, acute or sometimes obtuse, cuneate, 2–5 cm. long, crenulate-serrate, rarely slightly lobed, pubescent above when young, glabrous and lustrous at maturity: infl. many-fld., glabrous; fls. 8 mm. across, fading to orange; stamens 15–20: fr. subglobose, about 1 cm. across, blue and bloomy; nutlets 3–5. Fl.iv–v; fr.viii. S.S.4: t.177. Tex. to La. Intr. 1900. Zone VIII?

A related species is **C. salígna** Greene. Spines about 2 cm. long: fr. globose, 6 mm. across, red, finally blue-black, lustrous. S.S.13:t.636. Colo. Intr. 1902. Zone V?

Group 16. Aestivales Sarg.

21. **C. aestivàlis** Torr. & Gray. May Haw (Apple Haw). Tree to 10 m. with a round compact head, unarmed or with stout spines 2–3.5 cm. long: lvs. elliptic to oblong-obovate, 2.5–3 cm. long, acute or rounded, gradually narrowed into a petiole 6–20 mm. long, crenate-serrate or remotely dentate above the middle, on shoots sometimes 3-lobed, lustrous above, rusty-pubescent below, particularly on the veins: fls. with the lvs. about 52. cm. across, in 2–5-fld. glabrous infl.: fr. depressed-globose, 1.5–2 cm. across, bright red, fragrant, with juicy flesh; nutlets 3–5. Fl.iii–iv; fr.v–vi. S.S.4:t.192. Fla. to Ark. and Tex. Intr. ? Zone VIII?—The fr. is made into preserves and jellies.

Group 17. Parvifoliae Loud. (*Uniflorae* Beadle)

22. **C. uniflòra** Moench. Dense low shrub, to 2.5 m., with numerous slender spines, rarely unarmed: lvs. short-petioled, obovate to oblong-obovate, obtuse, cuneate, 1.5–3.5 cm. long, coarsely or doubly crenate-serrate, pubescent on both sides, finally glabrous above: fls. 1–3, about 1.5 cm. across; calyx pubescent, with large serrate lobes: fr. globose or pyriform, about 1 cm. long, yellow or greenish yellow with conspicuous calyx; nutlets 3–5. Fl.v–vi; fr.x. W.D.65(c). S.S.4:t.191. (*C. parvifolia* Ait., *C. florida* Lodd., *C. tomentosa* L., in part, Egglest.) Ga. and Ala. to Fla. Intr. 1713. Zone VI?

Closely related species are: **C. Smíthii** Sarg. differing chiefly in the finely and doubly serrate lvs. and shorter and broader calyx-lobes. S.T.1:t.34. Pa. Intr. 1903. Zone V.—**C. Brittònii** Eggl. differing in its elliptic or ovate acute lvs., in the 2–6-fld. corymbs and in the dull red fr. (*C. Vailiae* Beadle, not Brit.) Va. to Ga. and Ala. Intr. 1906. Zone V.

Group 18. Flavae Loud.

23. **C. áprica** Beadle. Shrub or small tree to 6 m., with spreading brs. and slender zigzag brts.; spines thin, straight, 2–3.5 cm. long: lvs. broad-obovate or oval, acute or rounded, cuneate, 2–3.5 cm. long, serrate usually only above the middle, and often slightly lobed, with gland-tipped teeth, pubescent while young, finally glabrous, thickish: fls. 1.8 cm. across, in 3–6-fld. pubescent compact corymbs; sepals glandular-serrate; stamens 10; anthers yellow: fr. globose, 1.2 cm. across, dull orange red; nutlets 3–5. Fl.v; fr.x. S.S.13:t.698. Va. to Ga. and Tenn. Intr 1876. Zone V.—A very distinct and handsome species with small lvs.

A related species is **C. ellíptica** Ait. Lvs. larger, 2–5 cm. long, crenately serrate and often slightly lobed: fls. few: fr. pyriform, green or reddish. B.R.1932, 1939. G. C. III.27:404. (*C. flava* var. *lobata* Lindl., *C. lobata* **Loud.**) Orig. unknown; cult. 1789. Zone VII?—A similar species is **C. flava** Ait. differing chiefly in the less pubescent lvs., 20 stamens with purple anthers and in the ellipsoid orange-brown fr. S.S.13:t.693. Ga., Fla. Apparently not now in cult.

Group 19. APIIFOLIAE Loud.

24. **C. apiifòlia** Michx. (not Med.). Shrub or small tree to 6 m.; brts. pubescent while young; spines 2–3 cm. long; lvs. broad-ovate to reniform, 2–4 cm. long, pinnately 5–7-cleft, serrate, glabrous or slightly pubescent when young; petioles slender, 1.5–2.5 cm. long: infl. 3–12-fld., villous; fls. 1.8 cm. across: fr. ellipsoid, 6–8 mm. high, scarlet; sepals reflexed, lanceolate, serrate, sometimes partly deciduous. Fl.IV–V; fr.X. S.S.4:t.188. (*C. Marshallii* Egglest.) Va. to Fla., Ark. and Tex. Intr. 1812. Zone (V).—A graceful shrub or small tree with widespreading slender brs., abundant white fls. in spring and attractive fr. in autumn.

Group 20. MICROCARPAE Loud.

25. **C. spathulàta** Michx. Shrub or small tree, to 8 m.: lvs. unarmed or with straight stout spines about 3 cm. long: lvs. rhombic-obovate to oblanceolate, acute or rounded and sometimes 3–5-lobed at apex, cuneate, 1–3.5 cm. long, crenate-serrate, glabrate at maturity: fls. about 1 cm. across in many-fld. glabrous corymbs: fr. subglobose, 4–6 mm. thick, with reflexed, deltoid, entire sepals, scarlet. Fl.V–VI; fr.X. B.R.1846(c). S.S.4:t.185. (*C. microcarpa* Lindl.) Va. to Fla., Okl. and Tex. Intr. 1806. Zone (V).

Group 21. CORDATAE Beadle

26. **C. phaenopỳrum** Med. WASHINGTON THORN. Tree to 10 m., glabrous; spines slender, to 7 cm. long; lvs. broad- or triangular-ovate, acute, truncate or subcordate, 3–7 cm. long, sharply serrate and 3–5-lobed, bright green and lustrous above, paler below; petioles slender, 1.5–3.5 cm. long: fls. 1.2 cm. across, in many-fld. corymbs; sepals entire, deltoid; stamens 20; anthers pink: fr. depressed-globose, 8 mm. across, scarlet, lustrous; sepals deciduous, leaving a circular scar; nutlets 3–5. Fl.V–VI; fr.IX–X. B.R.1151(c). S.S.4: t.186. Gn.87:461. F.E.28:103(h). B.S.1:424(h). (*C. cordata* Ait., *C. acerifolia* Moench, *C. populifolia* Walt.) Va. to Ala. and Mo. Intr. 1738. Zone V.—A very desirable tree with dense round head, particularly beautiful in autumn with its bright scarlet fr. in large clusters while the lvs. are turning scarlet and orange.

Group 22. ANOMALAE Sarg.

27. **C. scábrida** Sarg. Shrub or small tree to 6 m.; brts. glabrous; spines 3–5 cm. long: lvs. elliptic to obovate, 5–7 cm. long, short-acuminate, broad-cuneate, with many short spreading sharply and irregularly glandular-dentate lobes, at first finely pubescent above, soon glabrous, thick at maturity, dark green; petioles 1–2.5 cm. long: fls. 1.8 cm. across, in many-fld. loose glabrous corymbs; sepals linear-lanceolate, glandular-serrate; stamens 5–15; anthers pink: fr. subglobose, scarlet, 1 cm. across; nutlets 2–4. Fl. V–VI; fr. IX. (*C. Brainerdi* var. *s.* Eggl.) S. e. Can. to Pa. Intr. 1899. Zone IV.

A closely related species is **C. asperifòlia** Sarg. Shrub to 2 m.: lvs. with persistent hairs above: cymes sometimes slightly villous; fr. short-ellipsoid. (*C. Brainerdi* var. *a.* Eggl.) S. e. Can. to N. Y. and N. H. Intr. 1902. Zone IV.

Group 23. MACRACANTHAE Loud. (*Tomentosae* Sarg.)

28. **C. tomentòsa** L. Shrub or small tree to 6 m., with spreading brs., unarmed or with short spines; young brts. pubescent: lvs. elliptic to obovate-oblong, acute, cuneate, 5–12 cm. long, serrate and often slightly lobed, dull green and finally glabrous above, pubescent beneath: fls. 1.2 cm. across in many-fld. pubescent corymbs 6–12 cm. across; sepals serrate; stamens 15–20; anthers pink: fr. ellipsoid or pear-shaped, about 1 cm. long, dull yellow or

yellowish red, pulpy; stones 2–3. Fl.VI; fr.X. B.R.1877(c). Ad.4:t.154(c). S.S.4:t.183. G.F.2:425. Gn.22:145. (*C. Calpodendron* Med., *C. pyrifolia* Ait., *C. leucophloeos* Moench, *C. Chapmanii* Ashe.) Ont. to Ga., w. to Minn. and Kan. Intr. 1765. Zone V.

A related species is **C. Wilsònii** Sarg. Shrub to 6 m.: lvs. ovate to obovate, acute or obtuse, at maturity lustrous above, sparingly villous beneath: fr. ellipsoid, about 1 cm. long, red. C. China. Intr. 1907. Zone V.

29. **C. succulénta** Lk. Tree to 5 m., with stout ascending brs.; spines stout 3–5 cm. long: lvs. broad-elliptic to obovate, acute or short-acuminate, cuneate, 5–8 cm. long, coarsely and doubly serrate, lustrous above, pubescent beneath on the veins, finally glabrous: fls. 1.8 cm. across, in many-fld. villous corymbs; sepals glandular-serrate, stamens 15–20; anthers pink: fr. globose, 1.5 cm. across, bright red, pulpy. Fl.V; fr.IX–X. Lange, Rev. Crat.t.8B. Ad.4:t.123(c). S.S.4:t.181(as *C. cocc.* var. *macracantha*). (*C. macracantha* var. *s.* Rehd.) Que. and Ont. to Mass. and Ill. Cult. 1830. Zone IV.

30. **C. macracántha** Lodd. Shrub or small tree to 5 m.; spines slender, sometimes 10 to 12 cm. long: lvs. broad-elliptic to obovate, usually acute, cuneate, 5–8 cm. long, doubly serrate, lustrous and dark green above, nearly glabrous beneath; petioles about 1 cm. long: fl. 1.8 cm. across; infl. slightly villous; stamens 10; anthers yellow; sepals glandular-serrate: fr. subglobose, 8 mm. across, dark cherry-red, lustrous, pulpy. Fl.V–VI; fr.IX–X. B.R.1912(c). L.B.1012(c, as *C. glandulosa*). S.S.13:t.689. M.G.21:561(h). (*C. coccinea* var. *m.* Dudley, *C. succulenta* var. *m.* Egglest.) W. N. Y. and Vt. to Pa. Intr. about 1820. Zone V.—Handsome shrub of dense habit with dark green shiny lvs. and conspicuous lustrous red fr. in autumn.

A related species or possibly hybrid with *C. crus-galli* is **C. prunifòlia** Pers. Lvs. obovate or broad-obovate, pubescent on the veins beneath when young: infl. pubescent; anthers pink: stones only slightly grooved on the inner surface. B.R.1868(c). G. C. III. 78:146,t. Orig. unknown; cult. 1807? Zone V.

Group 24. Douglasianae Rehd. (*Douglasii* Loud.)

31. **C. Douglásii** Lindl. Tree to 12 m. with slender, often pendulous brs., unarmed or with few short spines: brts. glabrous: lvs. broad-ovate to ovate-oblong, acute or sometimes rounded, cuneate, 3–8 cm. long, serrate and slightly lobed, pubescent on the veins at first, finally lustrous dark green above, pubescent on the midrib, glabrous beneath; petiole about 1 cm. long: fls. 1 cm. across, in glabrous corymbs; stamens 20; sepals triangular-ovate, usually glandular-serrate above the middle: fr. short-ellipsoidal, 1.2 cm. long, black and lustrous; stones 3–5. Fl.V; fr.VIII–IX, soon falling. B.R.1810(c). S.S. 4:t.175. B. C. and N. Cal. to Minn. and Wyo. Intr. 1828. Zone V.

A closely related species is **C. rivulàris** Nutt. Smaller tree, with ascending brs.: lvs. shorter-stalked, narrower, serrate; sepals shorter, entire. S.S.4:t.176. (*C. Douglasii* var. *r.* Sarg.) Wyo. to Colo. and Utah. Intr. 1881. Zone V.

Group 25. Sanguineae Zabel

32. **C. chlorosárca** Maxim. Small tree of pyramidal habit; young brs. slightly pubescent, later purple-brown, lustrous: lvs. triangular-ovate to broad-ovate, acute or short-acuminate, broad-cuneate or rounded at base, 5–9 cm. long, with 3–5 pairs of short and broad, unequally serrate lobes, loosely pubescent on both sides, finally glabrous above and dark green; petioles slender, 8–20 mm. long: infl. 4–7 cm. across, nearly glabrous: fls. 1.2 cm. across, stamens 20; sepals serrulate; top of ovary pubescent; style inserted much below apex; fr. subglobose, about 1 cm. across, black; nutlets

5. Fl.v; fr.ix–x. S.H.1:f.437p-q,f.438n-o. Manch. Cult. 1880. Zone II.—Var. **pubéscens** Wolf. Lvs. pubescent beneath. Cult. 1908.

Related species are: **C. jozâna** Schneid. Brts. villous: lvs. with 5–7 pairs of lobes, pubescent beneath: infl. villous. Japan. Intr. 1888. Here belongs apparently *C. atrocarpa* Wolf. Yearb. For. Inst. Petersb.15:250,t.—**C. dsungârica** Zabel. Lvs. rhombic-ovate to broad-ovate, cuneate, 3–8 cm. long, more deeply lobed, lobes fewer, sparingly toothed, glabrous: infl. glabrous, loose; fls. 1.5 cm. across; style inserted slightly below apex. S.H.1:f.437k-m,438p-q. S. E. Siber., N. China. Cult. 1885. Zone V.

33. **C. sanguínea** Pall. Shrub or small tree to 7 m., with spreading brs., usually unarmed, or with short spines; brts. slightly hairy at first, soon glabrous: lvs. rhombic-ovate to broad-ovate, acute or short-acuminate, cuneate, 5–8 cm. long, with 2–3 pairs of short, sharply and sometimes doubly serrate lobes, slightly pubescent on both sides; petiole 8–15 mm. long: fls. 1.5 cm. across, in rather dense glabrous corymbs; stamens 20; anthers pink or purple; style inserted near apex: fr. globose, 1 cm. across, bright red. Fl.v; fr.viii–ix. W.D.60(c). S.H.1:f.437c-h,438d-f. (*Mespilus purpurea* Poir.) E. Siber. Intr. 1822. Zone IV?—Var. **chlorocárpa** Schneid. Fr. yellow, smaller.

C. s. × ? *nigra* = **C. Lambertiàna** Lge. Young brts. pubescent: lvs. pubescent beneath: infl. few-fld., pubescent: fr. blackish purple. Lange, Rev. Crat. 58. Orig. unknown. Cult. 1871.

A closely related species is **C. Maximowíczii** Schneid. Lvs. less deeply lobed, villous below: infl. densely villous; fr. villous when young. N.K.6:t.28. S.H.1:f. 437a-b′, 438a-c. (*C. sanguinea* var. *villosa* Maxim.) N. E. Asia. Cult. 1904. Zone IV.—Another related species is **C. dahùrica** Koehne. Lvs. rhombic-ovate, or elliptic-ovate, 2–5 cm. long, those of the flowering brts. often slightly or scarcely lobed: infl. glabrous: fr. subglobose, 7–8 mm. across, orange-red. S.H.1:f.437n-n, 438g-i. S. E. Siber. Cult. 1895. Zone V.—Graceful species, one of the earliest to burst into leaf.

34. **C. Wattiàna** Hemsl. & Lace. Small tree; brts. lustrous, red-brown, unarmed or with short spines; glabrous: lvs. ovate, acute or short-acuminate, truncate or broad-cuneate, 5–9 cm. long, with 3–5 pairs of usually ovate, acute or acuminate sharply and unequally serrate lobes, the sinuses reaching rarely halfway to the middle; petioles 1–2 cm. long: infl. 5–8 cm. across; stamens 15–20; anthers whitish: fr. subglobose, 1–1.2 cm. across; orange- or reddish-yellow, pulpy. Fl.v; fr.viii–ix. R.H.1801:301,t(c). Jour. Linn. Soc.28:t.40. (*C. Korolkowii* L. Henry.) N. China to Beluchistan. Cult. 1888. Zone V. —A handsome species with bright green lvs., large corymbs of white fls. and bright yellow fr. in late summer.

A closely related species is **C. altáica** Lange. Lvs. usually smaller, with 2–4 pairs of lobes, the sinuses reaching usually more than halfway to the middle, and the lower ones often almost or quite to the midrib; petiole 1.5–3 cm. long: fr. 8–10 mm. across. Lange, Rev. Crat.t.5(excl.f.g). (*C. sanguinea* var. *incisa* and var. *xanthocarpa* Reg., *C. songarica* Reg.) Songaria to Turkest. Intr. 1876. Zone V.

Group 26. Nigrae Loud. (*Pentagynae* Schneid.)

35. **C. nígra** Kit. Small tree to 7 m., with a round head of rather short brs.; brts. tomentose while young, unarmed or with short stout spines: lvs. ovate or triangular-ovate, acute, broad-cuneate or truncate, 4–9 cm. long, with 7–11 sharply and irregularly serrate lobes, the lower sinuses not more than halfway to the middle, pubescent on both sides, more densely beneath; petioles 1–2 cm. long, villous: infl. dense, many-fld., villous; pedicels short; fls. 1.5 cm. across, white, fading to pink; anthers yellow; top of ovary glabrous: fr. subglobose, 1.2 cm. across, black, lustrous, pulpy. Fl.v; fr.viii. R.I.25: t.102(c). L.B.1021(c). L.I.t.30. (*C. carpathica* Lodd.) S. E. Eu. Cult. 1810. Zone IV.

C. n. × *sanguinea* = *C. Lambertiana;* see under No. 33.

36. **C. pentágyna** Waldst. & Kit. Shrub or small tree to 5 m.; young brts. pubescent; spines short: lvs. broadly rhombic-ovate or broad-ovate to obovate, truncate or broad-cuneate, 2–6 cm. long and usually nearly as broad, with 3–7 irregularly serrate lobes, on sterile shoots often elongated and with the lobes more than halfway to the middle, pubescent while young, finally nearly glabrous: fls. 1.2–1.5 cm. across, in pubescent corymbs 4–7 cm. broad; anthers pink; top of ovary pubescent: fr. ellipsoid, 1.2 cm. long, black-purple, dull; nutlets 4–5. Fl.v–vi; fr.ix. R.I.25:t.101(c). B.R.1874(c). R.H.1901:310,t (c). (*C. melanocarpa* Bieb.) S. E. Eu., Cauc., Persia. Cult. 1836. Zone V. —Var. **Oliveriàna** Rehd. More pubescent, mature lvs. slightly pubescent above, more densely beneath: fr. smaller. B.R.1933(c). (*C. Oxyacantha* var. *O.* Loud., *C. Oliviriana* Bosc.) W. Asia. Cult. 1810.

C. p. × ? *crus-galli* = **C. hiemàlis** Lge. Lvs. densely serrate and often slightly lobed, pubescent on the veins beneath: infl. villous; stamens 15; anthers purple: fr. purple-black. Bot. Tidsskr.13:t.2(c). Lange, Rev. Crat.,t.9(c). Orig. before 1880.—*C. p.* × ? = **C. Celsiàna** Bosc. Lvs. elliptic-ovate, cuneate, 4–8 cm. long, with 3–5 pairs of serrate lobes pointing forward: fr. ellipsoid, bright red; nutlets 2–3. Lange, Rev. Crat.t.3a. S.H.1:f.441q-r,442g-i. Orig. before 1830.

Group 27. Oxyacanthae Loud.

37. **C. Oxyacántha** L. Hawthorn (May of English literature). Shrub or small tree, to 5 m. with spreading brs.; spines stout, to 2.5 cm. long: lvs. broad-ovate or obovate, cuneate, 1.5–5 cm. long, with 3–5 broad serrulate, obtuse or acutish lobes, glabrous; petioles 6–15 mm. long: infl. glabrous, 5–12-fld., fls. 1.5 cm. across; stamens 20; anthers red; styles 2–3: fr. subglobose or broad-ellipsoid, 8–15 mm. long, scarlet, with 2 nutlets. Fl.v; fr.ix–x. B.R.1128(c). R.I.25:t.103(c). (*C. oxyacanthoides* Thuill.) Eu., N. Afr. Long cult. Zone IV.—Var. **ròsea** Willd. Fls. rose. Orig. before 1770.—Var. **punícea** Loud. Fls. dark red. L.C.1363(c). F.S.15:t.1509,f.1(c).—Var. **Paùlii** Rehd. Fls. double, bright scarlet. I.H.14:t.536(c). (Var. *coccinea plena* Hort., var. *splendens* Schneid., var. "Paul's New Double Scarlet.") One of the most showy garden forms. Orig. 1858.—Var. **plèna** Weston. Fls. double, white. F.S.15:t.1509,f.2(c). (Var. *multiplex* Loud., *C. monogyna albo-plena* Rehd.) Orig. before 1770.—Var. **aùrea** Weston. Fr. yellow. Orig. before 1770.

C. O. × *monogyna* = **C. mèdia** Bechst. R.I.25,t.105,f.2(c). Here may belong some of the garden forms.—*C. O.* × ? = **C. sorbifòlia** Lge. Lvs. long-petioled, elliptic to ovate, with short obtuse crenate lobes, dark green and lustrous above, puberulous on the veins beneath, chartaceous: infl. several-fld.; stamens 12–18: fr. ellipsoid; nutlets 2–3. Lange, Rev. Crat.t.2(c). (*C. Oxyacantha* var. *s.* Dipp.) Orig. unknown. Cult. 1877. Zone V.—*C. O.* × *Mespilus germanica* = *Crataegomespilus grandiflora;* see p. 363.—*C. O.* × *Pyrus communis* = *Pyrocratacgus Willei;* see p. 376.

38. **C. monógyna** Jacq. Shrub or tree to 10 m., similar to the preceding: lvs. more deeply 3–7-lobed, with narrower acute lobes usually only with a few teeth at apex; pedicels and calyx sometimes hairy; style 1, rarely 2: fr. ellipsoid, with 1 stone. Fl.v; fr.ix–x. R.I.25:t.104(c). R.H.1900:72. Gn.40: 500(h);52:266(h). (*C. Oxyacantha* var. *m.* Loud.) Eu., N. Afr., W. Asia. Long cult. Zone IV.—Var. **pteridifòlia** Rehd. Lvs. deeply lobed with broad closely incised-serrate lobes. F.S.20:t.2076(c). (*C. Oxyacantha filicifolia* Van Houtte.)—Var. **stricta** Rehd. Of fastigiate habit with erect brs. (*C. Oxyacantha* var. *s.* Loud., var. *pyramidalis* Hort., var. *fastigiata* Hort., *C. m.* var. *fastigiata* Dipp.) M.G.21:390(h). M.A.t.36(h).—Var. **péndula** Dipp. With pendulous brs. Gn.68:288(h). G.M.44:827. M.G.17:25, 26(h). (*C. Oxyacantha p.* Loud.)—Var. **semperflòrens** Dipp. A low shrubby form flowering continuously or at intervals until August. R.H.1883:140. Gn.29:431;

33:465. (*C. Oxyacantha Bruantii* Carr.)—Var. **Azarélla** Koehne. Young brts., lvs. and the loose infl. villous. (*C. A.* Griseb.) S. E. Eu. Intr. before 1880. Zone V.

C. m. × *Oxyacantha* = *C. media;* see under No. 37.—*C. m.* × *Mespilus germanica* = *Crataego-mespilus Gillotii;* see p. 363.

Closely related species are: **C. heterophýlla** Fluegge. Lvs. usually deeply 3-fid., the lower ones oblong, serrate only at apex, those of the shoots pinnatifid: infl. loose, glabrous; top of ovary glabrous: fr. larger, 1.5–1.8 cm. long. B.R.1161(c), 1847(c). ? W. Asia. Intr. about 1816. Zone V.—**C. ambígua** C. A. Mey. Lvs. deeply 4–7-lobed, slightly pubescent on both sides: infl. slightly hairy: fr. ellipsoid, usually with 2 nutlets. R.I.25:t.105,f.4–7(c). S. Russia. Intr. 1858. Zone V.

Group 28. Azaroli Loud. (*Orientales* Zabel)

39. **C. Azárolus** L. Shrub or small tree to 10 m.; spiny or unarmed; young brts. tomentulose: lvs. rhombic-obovate or rhombic-ovate, cuneate, 3–7 cm. long, deeply 3–5-lobed, with narrow lobes nearly entire or incised at apex, pubescent on both sides, finally nearly glabrous above; petioles 1–2.5 cm. long: fls. 1.2 cm. across, in dense tomentose corymbs 5–7 cm. across; stamens 20; anthers purple: fr. subglobose, about 2 cm. across, orange-red or yellow, of apple-like flavor; nutlets 1–2. Fl.v; fr.ix. R.I.25:t.106(c). B.R.1897(c). R.H.1856:441,t(c). M.A.t.35(h). (*C. Aronia* Ser., *C. maura* L. f.) S. Eu., N. Afr., W. Asia. Cult. 1700. Zone VI?—Var. **sináica** Boiss. Lvs. glabrous: fr. usually reddish yellow. B.R.1855(c, as *C. maroccana*). Gn.22:146;28:634. (*C. s.* Boiss.) W. Asia. Intr. 1822. Zone VI?

40. **C. orientàlis** Pall. Small tree to 7 m., with spreading brs. and pendent brts. tomentose while young: lvs. short-petioled, obovate or oblong-obovate, cuneate, 3–5 cm. long, pinnatifid with 5–9 narrow lobes incisely toothed at apex, pubescent above, tomentose beneath: fls. nearly 2 cm. across, in dense tomentose corymbs; sepals entire; fr. depressed-globose, 1.5–2 cm. across, brick- or orange-red, pubescent; nutlets 4–5. Fl.vi; fr.x. B.M.2314 (c). B.R.1885(c). G.C.III.72:310. Gn.28:632,t(c, as *C. tanacetifolia*). (*C. odoratissima* Lindl.) S. E. Eu., W. Asia. Intr. 1810. Zone V.—Var. **sanguínea** Loud. Lvs. less pubescent, with broader lobes: fr. dark red, with 2–4 nutlets. B.R.1852(c). (*C. Tournefortii* Griseb., *C. orientalis* var. *Tournefortii* Schneid., *C. sanguinea* Schrad., not Pall.) S. E. Eu. Intr. 1910. Zone V.—A small tree handsome in fl. and fr.

A related species is **C. Heldreìchii** Boiss. Lvs. only 1.5–3 cm. long, with rounded entire or nearly entire lobes: fr. red. S.H.1;f.448t-v',451p-r. Greece. Cult. 1890. Zone V.

41. **C. tanacetifòlia** Pers. Shrub or small tree to 10 m., with upright brs.; unarmed or spiny: young brts. tomentose: lvs. short-stalked, obovate or rhombic-ovate, cuneate, 2–5 cm. long, pinnatifid, with 5–7 narrowly oblong glandular-serrate lobes, villous-pubescent on both sides; stipules large, curved, serrate: fls. 2–2.5 cm. across, in dense 5–8-fld. tomentose corymbs; sepals large, glandular-serrate: fr. yellow or reddish, 2–2.5 cm. across, with laciniate bracts at base; nutlets 5. Fl.v–vi; fr.ix. B.R.1884(c). Gt.43:15. J.L.41:f. 10(h). G.C.III.71:285(h). W. Asia. Intr. 1789. Zone V.

C. t. × ? *punctata* = **C. Dippeliàna** Lge. Lvs. lobed less than halfway to the middle, lobes acute, serrate, pubescent above, more densely beneath: corymbs dense; anthers red: fr. yellow, red or dull red. Lange, Rev. Crat.t.10(c). D.H.3: 452. (*C. Celsiana* Dippel, not Bosc, *C. tanacetifolia* var. *Leeana* Loud., *C. Leeana* Bean.) Orig. probably about 1830. Zone V.

Group 29. Pinnatifidae Zabel

42. **C. pinnatífida** Bge. Tree to 6 m.; brts. glabrous; spines wanting or short: lvs. broad- or triangular-ovate to rhombic-ovate, truncate or broad-

cuneate, 5–10 cm. long, pinnately 5–9-lobed, the lower pair of lobes often divided nearly to the midrib, the lobes sharply and irregularly serrate, lustrous and dark green above, light green beneath, pubescent on the midrib and veins on both sides; petiole 2–6 cm. long; stipules large, serrate: fls. 1.8 cm. across, in villous corymbs 5–8 cm. across; stamens 20; anthers pink: fr. subglobose or pyriform, 1.5 cm. across, red, punctulate; stones 3–4. Fl.v–vi; fr.ix. Gt.11: t.366. R.H.1901:308,t(c). N.K.6:t.26. N. E. Asia. Cult. 1860. Zone V.—Var. **psilòsa** Schneid. Lvs. and infl. quite glabrous. N.K.6:t.26c.—Var. **màjor** N. E. Br. Larger, more vigorous tree: lvs. larger, less deeply lobed, thicker: fr. about 2.5 cm. across, deep lustrous red. R.H.1901:308,t(c). G.C.II.26:620. N.K.6:t.27. U.S.Im.97:t.102;t.108:t(h). U.S.Inv.35:t.8(fr); 40:t.2(h). (*C. Korolkowii* Schneid., not Henry, *C. Bretschneideri* Schneid., *C. tatarica* Hort.) N. China. Cult. 1880.—Handsome ornamental tree with lustrous lvs. and showy fr. particularly large in var. *major* which is cult. in N. China for its edible fr.

A supposed graft-hybrid between *Crataegus* and *Pyrus* is **Pyrocrataègus** Daniel of which only the following incompletely described form is known: **P. Willei** Daniel (*Crataegus Oxyacantha* × *Pyrus communis*). Lvs. similar to Pyrus; infl. corymbose: fr. pear-shaped, 1.5–3 cm. long. Norsk Havetid.12:85,f.8. Orig. before 1896.

17. **OSTEOMÈLES** Lindl. Deciduous or evergreen shrubs; winter-buds small, with several narrow scales: lvs. pinnate, alternate; stipules linear to lanceolate; lfts. small, entire: fls. white, in terminal corymbs; calyx-teeth acute or acuminate; petals 5, ovate-oblong; stamens 15–20; styles 5, distinct; ovary 5-celled, each cell with 1 ovule: fr. a small pome with persistent calyx and 5 nutlets. (Greek *osteon*, bone, and *meles*, apple.) Three species in E. Asia and Polyn.

O. Schwerìnae Schneid. Deciduous or half-evergreen, slender-branched shrub, to 3 m.; brts., petioles and lvs. beneath grayish pubescent; lvs. 3–7 cm. long, with narrowly winged rhachis; lfts. 15–31, elliptic to elliptic- or obovate-oblong, acute and mucronulate, 4–12 mm. long: fls. 1.5 cm. across, in loose terminal corymbs 3–6 cm. across; sepals lance-ovate, glabrous inside, pubescent outside; calyx-tube glabrescent: fr. globose-ovoid or subglobose, 6–8 mm. long, bluish black, glabrous. Fl.v–vi; fr.ix. B.M.7354(c). G.C. III.50:533, both as *O. anthyllidifolia*. B.S.2:114. W. China. Intr. 1888. Zone VII or VIII?—Var. **microphýlla** Rehd. & Wils. Lfts. fewer, elliptic to obovate, 3–5 mm. long, glabrescent: infl. smaller and denser. Intr. 1908. Supposed to be hardier.—Graceful shrub with small pinnate lvs.

The closely related evergreen **O. anthyllidifòlia** Lindl. from Polynesia and the Bonin Isls. (Trans. Linn. Soc.13:t.8) and **O. subrotúnda** K. Koch from E. China (H.I.27:t.2644) are probably not hardy within our area.

18. **SORBUS** L. Deciduous trees or shrubs; buds with imbricate scales, usually rather large; lvs. alternate, stipulate, simple and serrate, or odd-pinnate, folded or rarely convolute in bud: fls. white, rarely pink, in compound terminal corymbs; sepals and petals 5; stamens 15–20; carpels 2–5, 2-ovuled, either partly free and half-superior or wholly connate and inferior; styles free or connate at base: fr. a 2–5-loculed pome, usually rather small; the cells with cartilaginous walls, each with 1 or 2 seeds. (Ancient Latin name.) Including *Aria* Host (*Hahnia* Med.), *Cormus* Spach, *Torminaria* Roem. and *Micromeles* Decne. About 80 species distributed through the n. hemisphere, in N. Am. to N. C. and N. Mex., in Asia to the Himal.—The Sorbus are attractive in bloom with their large clusters of white fls. and most of them bear showy red fr. in autumn.

Lvs. pinnate, sometimes only partly so

A. Lvs. all regularly pinnate.
BB. Fr. small 6–10 mm. thick, berry-like, red, rarely yellow or white.
CC. Lfts. 9–17, 1.5–10 cm. long.
DD. Fr. red or yellow; styles 2–4.
EE. Winter-buds glutinous, glabrous or slightly rusty-pubescent.
FF. Lfts. acuminate, lanceolate.
GG. Lvs. bright green and dull above; lfts. 11–17; infl. 6–12 cm. across: trees.
HH. Lfts. acuminate, 4–10 cm. long, with acute or acuminate teeth, slightly pubescent beneath while young.....1. *S. americana*
HH. Lfts. long-acuminate, 2.5–8 cm. long, with aristate teeth, quite glabrous beneath (except in the var.).....2. *S. commixta*
GG. Lvs. dark green and lustrous above; lfts. 9–11: infl. glabrous, 4–6 cm. across: shrub.....3. *S. sambucifolia*
FF. Lfts. rounded or abruptly acute at apex, oblong.....4. *S. decora*
EE. Winter-buds not glutinous, woolly-pubescent.
FF. Young brts. and lvs. pubescent.
GG. Stipules large, persistent.....5. *S. pohuashanensis*
GG. Stipules small, caducous.....6. *S. Aucuparia*
FF. Young brts. and lvs. glabrous or nearly so.....7. *S. tianshanica*
DD. Fr. white: lvs. glaucous and glabrous beneath; rhachis usually purple.8. *S. discolor*
CC. Lfts. 19–29, 8–25 mm. long.
DD. Lfts. serrate usually only above the middle: infl. rufous-pubescent: fr. pale rosy-red.....9. *S. Vilmorini*
DD. Lfts. serrate from near the base: infl. nearly glabrous: fr. whitish 10. *S. Koehneana*
BB. Fr. 1.5–3 cm. across, apple- or pear-shaped, yellowish, with red cheek and with grit-cells; styles 5.....11. *S. domestica*
AA. Lvs. pinnate only toward the base, the upper part lobed and serrate, occasionally only lobed. (See also Sorbaronia, p. 383.).....12. *S. hybrida*

Lvs. simple, lobed or serrate

A. Fr. with persistent calyx.
B. Lvs. glabrous beneath at length, broad-ovate, lobed: ovary inferior: fr. brown, with grit-cells.....13. *S. torminalis*
BB. Lvs. tomentose beneath or glabrescent and not lobed: ovary half-inferior: fr. usually red, without grit-cells.
C. Lvs. lobed.
D. Lvs. broad-ovate, with 4–6 pairs of veins, usually rounded at base..14. *S. latifolia*
DD. Lvs. ovate to ovate-oblong, with 4–8 pairs of veins, broad-cuneate at base. 15. *S. intermedia*
CC. Lvs. sharply and doubly serrate.
D. Fls. white: lvs. white-tomentose beneath.....16. *S. Aria*
DD. Fls. pink, with upright petals: lvs. usually glabrous beneath.17. *S. chamaemespilus*
AA. Fr. with deciduous calyx.
B. Lvs. glabrous beneath or nearly so.
C. Styles usually 2.....18. *S. alnifolia*
CC. Styles 5.....19. *S. caloneura*
BB. Lvs. white-tomentose beneath.
C. Lvs. serrulate.....20. *S. Folgneri*
CC. Lvs. lobulate.....21. *S. japonica*

Sect. I. Sorbus Pers. (§. *Aucuparia* K. Koch.) Lvs. pinnate: carpels 2–4, rarely 5, more or less free above, partly superior; fr. red, yellow or white, 5–15 mm. across.

1. **S. americàna** Marsh. American Mountain-Ash. Small tree, to 10 m., sometimes shrubby: lfts. 11–17, lance-oblong to lanceolate, acuminate, 4–10 cm. long, sharply serrate, light green above, slightly pubescent beneath when young, soon glabrous, pale beneath: infl. glabrous, dense, 7–14 cm. across; fls. 5–6 mm. across: fr. globose, 4–6 mm. across, bright red, with connivent, very small calyx-lobes. Fl. v–vi; fr. x. N.S.2:t.50(c). S.S.4:t.171, 172. F.E.23:209(h);32:721(h). (*Pyrus a.* DC.) Nfld. to Man., s. to N. C. and Mich. Intr. 1782. Zone II or I.—Handsome tree, particularly showy in autumn with its bright red fr.

S. a. × *aucuparia* = **S. spléndida** Hedl. Winter-buds loosely pubescent and viscid: fls. and fr. larger. Gs.5:181,t. Cult.1850.—*S. a.* × *Aronia melanocarpa* = *Sorbaronia sorbifolia;* see p. 383.

A closely related species is **S. angustifolia** Rydb. Shrub to 5 m.: lfts. usually 13, narrow-lanceolate, 3–7 cm. long, glabrous: infl. slightly pubescent; fls. and fr. larger. Idaho to Mont. and Wash. Intr. 1918. Zone V.

2. **S. commíxta** Hedl. Shrub or small tree to 8 m.; buds glabrous, viscid; stipules deciduous; lfts. 11–15, elliptic-lanceolate to lanceolate, long-acuminate, 2.5–8 cm. long, sharply and sometimes doubly serrate, with acuminate or aristate teeth, glaucescent beneath: infl. 8–12 cm. across, rather loose, glabrous; fls. 8 mm. across; styles usually 3: fr. globose 6–8 mm. across, bright red. Fl.vi; fr.x. S.I.2:t.31(c). N.K.6:t.3. (*S. aucuparia* var. *japonica* Maxim., *S. japonica* Koehne, not Sieb.) Korea, Saghal., Japan. Cult. 1880. Zone V.—Var. **rufo-ferrugínea** Schneid. Lfts. beneath, rachis and infl. rufous-villous while young. (*S. r.* Schneid.) Japan. Intr. 1915.—Handsome small tree, similar to *S. americana*, but with smaller lvs. and looser corymbs.

Closely related species are: **S. reflexipétala** Koehne. Lfts. usually 15, to 5 cm. long: infl. nearly glabrous; petals reflexed; styles 3–4. Japan? Cult. 1890.—**S. serótina** Koehne. Lfts. usually 13, to 5 cm. long: infl. villous; petals reflexed: fr. smaller. Gs.1:183. Japan? Cult. 1900.

3. **S. sambucifólia** Roem. Shrub to 2.5 m.; young brts. slightly pubescent; buds slightly rufous-pubescent and viscid: lfts. 9–11, ovate-lanceolate to oblong-lanceolate, acuminate, very unequal at base, 3–7 cm. long, dark lustrous green above, lighter green beneath, soon quite glabrous: infl. 4–5 cm. across, sparingly rufous-pubescent; fls. 1–1.5 cm. across; calyx glabrous with ciliate lobes: fr. subglobose, 1–1.2 cm. across, with upright rather large sepals, red, slightly bloomy. Fl.vi; fr.ix. S.H.1:f.366a-b,367a-b. (*Pyrus s.* Cham. & Schlecht.) N. E. Asia, Japan. Cult. 1910. Zone I? or II.—This species has been much confused with *S. decora* and *S. sitchensis;* it is rare and apparently short-lived in cult.

4. **S. decòra** Schneid. Shrub or tree to 10 m.: lfts. 11–17, usually 15, elliptic to oblong or ovate-lanceolate, obtusish to abruptly short-acuminate, 3–7 cm. long, serrate with more or less spreading teeth, glabrous and dark green above, pale and usually pubescent while young: infl. 5–10 cm. across, rather loose, slightly pubescent; fls. 8–10 mm. across; fr. globose-ovoid while young, with upright calyx-lobes, 7–10 mm. across, bright red. Fl.v; fr.x. S.S.4:t.173, 174. (*S. americana* var. *d.* Sarg., *S. scopulina* Britt., not Greene, *Pyrus sambucifolia* Gray, not Cham. & Schlecht., *P. sitchensis* Rob. & Fern., not Piper.) Lab. to Minn., S. N. Y. and Vt. Intr. Zone I?—Owing to its larger fr. this species is showier than *S. americana* and often planted. Intermediate forms apparently of hybrid origin are occasionally observed.

Closely related species are: **S. dumòsa** Greene. Shrub to 4 m.: lfts. 11–14, elliptic to elliptic-lanceolate, 3–6 cm. long, abruptly short-acuminate, sharply and doubly serrate: infl. convex, smaller: fr. 7–8 mm. across. (*S. scopulina* Greene.) Alb. to Ore., Ariz., Colo. and N. Mex. Intr. 1917.—**S. sitchénsis** Roem. Shrub to 4 m.; lfts. 9–13, usually rounded at apex, sharply and rather coarsely serrate, light green beneath, glabrous: infl. glabrous. Alaska to Idaho and Ore. Intr. 1918. —*S. s.* × *Amelanchier florida* = *Amelasorbus Jackii;* see p. 384.—**S. pùmila** Raf. Shrub to 2 or 3 m.: lfts. 7–11, ovate to oblong, obtuse, serrate only near apex, bluish green: infl. 3–7 cm. across; styles 3–5. (*S. sambucifolia* var. *Grayi* Wenz., *S. occidentalis* Greene.) B. C. to Ore. and Idaho. Cult. 1913.

5. **S. pohuashanénsis** Hedl. Small tree; brts. villous; buds white-villous; stipules large, semi-ovate, toothed, persistent at least under the infl.: lfts. 11–15, elliptic-oblong to oblong-lanceolate, acute to acuminate, 2.5–6 cm. long, serrate usually from below the middle, glaucescent and pubescent beneath: infl. 10–12 cm. across, floccose-tomentose: fr. subglobose, 6–8 mm. across. Fl.v; fr.x. N. China. Intr. 1883. Zone V. or IV?

Related species are: **S. Conradìnae** Koehne. Buds partly and thinly silky-pubescent; lfts. ovate- to oblong-lanceolate, 4–10 cm. long, sharply and coarsely serrate, chartaceous, tomentose beneath. W. China. Intr. 1909. Zone V?—**S. Sargentiàna** Koehne. Buds very slightly villous; lfts. oblong-lanceolate, 8–13

cm. long, serrulate, tomentose beneath: infl. about 15 cm. across, densely villous: fr. scarlet, about 6 cm. across. W. China. Intr. 1908. Zone V?

6. **S. Aucupària** L. Rowan Tree. Tree to 15, occasionally to 20 m.; young brts. pubescent, grayish brown when older, buds tomentose: lfts. 9–15, oblong to oblong-lanceolate, acute or obtusish, 2–5 cm. long, serrate, usually entire in the lower third, dull green above, glaucescent beneath and pubescent, at least when young: infl. 10–15 cm. across, villous or sometimes nearly glabrous; fls. 8–10 mm. across; stamens about as long as petals: fr. globose, about 8 mm. across, bright red. Fl.v; fr.viii–ix. H.W.3:78,79(h),t. 54(c). R.I.25:t.114(c). (*Pyrus A.* Gaertn.—European Mountain Ash.) Eu. to W. Asia and Siber. Long cult. Zone II or III.—Var. **laciniata** Hartm. Lfts. incisely serrate, more pubescent.—Var. **integerrima** Koehne. Lfts. entire or with few teeth at apex.—Var. **xanthocárpa** Hartw. & Ruempl. With orange-yellow fr. (Var. *Fifeana* Hartw.)—Var. **fastigiàta** Hartw. & Ruempl. With upright brs. forming a tree of narrow-pyramidal habit. (*P. Aucuparia* var. *f.* Loud.)—Var. **péndula** Kirchn. A form with long pendulous brs. M.D.1911:247(h).—Var. **edùlis** Dieck. Nearly glabrous; petioles purplish; lfts. 4–7 cm. long, serrate usually only above the middle: fr. larger, of slightly acid agreeable flavor and used for preserves. R.I.25:t.114,f.11(c). (Var. *moravica* Zengerl., var. *dulcis* Kraetzl.) Intr. about 1886.—Var. **róssica** Spaeth. Similar to the preceding, but lfts. larger and more serrate.—Var. **Beissneri** Rehd. A graceful form of var. *edulis* with pinnately lobed lfts. and the petioles and brts. bright red. G.W.3:267,t(c). (*S. Aucuparia dulcis laciniata* Beiss.)—A handsome tree with very showy bright red fr. in autumn.

S. A. × *intermedia* = *S. hybrida;* see No. 12.—*S. A.* × *Aria* = *S. thuringiaca;* see under No. 12.—*S. A.* × *Aronia arbutifolia* = *Sorbaronia hybrida;* see p. 384.—*S. A.* × *Aronia melanocarpa* = *Sorbaronia fallax;* see p. 384.

A closely related species is **S. amurénsis** Koehne. Lfts. acuminate, incisely serrate above the middle, slightly pubescent beneath when young: fr. 6–9 cm. across, orange-red. N.K.6:13(h),t.2. N. E. Asia. Intr. 1907. Zone V or IV.

7. **S. tianshànica** Rupr. Shrub or small tree to 5 m.; buds pubescent; young brts. glabrous or nearly so, later red-brown and lustrous: lfts. 9–15, lanceolate, acuminate, 3–5 cm. long, serrate, entire near base, lustrous and dark green above, green beneath, glabrous: infl. glabrous, rather loose, 8–12 cm. across; fls. 1.8 cm. broad; stamens half as long as petals: fr. globose, 8 mm. across, bright red. Fl.vi. B.M.7755(c). Gt.40:8. (*Pyrus t.* Reg.) Turkest. Intr. 1895. Zone V.—Handsome shrub with dark green lustrous lvs.

8. **S. díscolor** Hedl. Tree to 10 m.; buds slightly pubescent; young brts. glabrous or nearly so, like the petioles usually purplish; stipules leafy, digitately toothed, persistent; lfts. 11–15, oblong to lanceolate, acute or acuminate, 3–8 cm. long, sharply serrate except at base, glaucous beneath, glabrous: infl. loose, 10–14 cm. across, glabrous or nearly so; fls. about 1 cm. across; styles usually 3: fr. 6–7 mm. across, globose-ovoid, white or yellowish. Fl.v; fr.ix. Gt.55:t.1551,f.7(c). S.H.1:f.366l-m,367g. (*S. pekinensis* Koehne, *Pyrus d.* Maxim.) N. China. Intr. about 1883. Zone V.—Handsome small tree remarkable for its peculiar white fr.

A related species is **S. hupehénsis** Schneid. Buds glabrous; stipules small, deciduous: lfts. 13–17, elliptic to oblong, acute or obtusish, usually entire at the lower third: style 4–5. C. and W. China.—Var. **apérta** Schneid. With 9–11 lfts. (*S. a.* Koehne.) Intr. 1910. Zone V.

9. **S. Vilmorìni** Schneid. Shrub or small tree to 6 m., with spreading brs.; young brts. and buds slightly rusty-pubescent; stipules narrow, deciduous: lfts. 19–25, elliptic-oblong to oblong, acute, 1.5–2.5 cm. long, serrate from below the middle or sometimes only near apex, glabrous, grayish green beneath;

rachis slightly winged and often slightly pubescent: infl. loose and slender-stalked, 5–10 cm. across; fls. 6 mm. across; styles 5: fr. globose, about 8 mm. across, pale rose-red. Fl.VI; fr.IX. B.M.8241(c). Gn.85:501;87:576. V.F. 103(h),104(as *Cormus foliolosa*.) (*Pyrus V.* Aschers. & Graebn.) W. China. Intr. 1889. Zone V.—Handsome and graceful shrub with conspicuous white fls. and rosy-red fr. in autumn.

10. **S. Koehneàna** Schneid. Shrub to 3 m.; young brts. glabrous or nearly so; buds slightly fulvous-pubescent; stipules small, semi-ovate, with few teeth, partly persistent: lfts. 17–25, oblong to oblong-lanceolate, acute, 1.5–3.5 cm. long, sharply serrate from near base, grayish green beneath, not papillose, slightly pubescent when young; rachis slightly winged: infl. 4–8 cm. across), slightly pubescent; fls. about 1 cm. across; anthers brown; styles 5; fr. subglobose, 6–7 mm. across, white. Fl.V–VI; fr.VIII. S.H.1:f.374o(l). C. China. Intr. 1910. Zone V.—Graceful shrub, attractive in autumn with its white fr. on red stalks.

Closely related species are: **S. Prâttii** Koehne. Lfts. entire on lower third or half, glaucous beneath and papillose, usually villous, chiefly on midrib: fr. white. W. China.—Var. **tatsienénsis** Schneid. Lfts. smaller, 1–2 cm. long, often entire only at base. G.C.III.68:153;72:226. Gn.87:556. Intr. about 1904. Zone V?—**S. glomerulàta** Koehne. Buds glabrous: lfts. 23–29, 1.5–2.5 cm. long, serrulate above the middle or near apex, glaucous beneath and glabrous or nearly so: infl. glabrous, consisting of 12–20 small dense clusters; styles 5: fr. white. C. China. Cult. 1910. —Another related species is **S. scalàris** Koehne. Shrub to 6 m.; stipules large, persistent: lfts. 23–29, oblong, 2–3 cm. long, serrate above the middle or nearly entire: infl. 12–14 cm. wide, rather dense, villous; styles 3–4: fr. 5–6 mm. across, bright red. W. China. Intr. about 1904. Zone V?

Sect. II. Cormus Spach. Lvs. pinnate: carpels 5, connate, inferior: fr. green or brown, 1.5–3 cm long.

11. **S. doméstica** L. Tree to 20 m.: bark scaly, rough; buds viscid, lustrous, pubescent at apex; brts. soon glabrous: lfts. 11–21, narrow-oblong, acute, sometimes rounded, 3–8 cm. long, sharply serrate with acuminate teeth, entire near base, glabrous above, floccose-tomentose beneath, at least while young: infl. broad-pyramidal, 6–10 cm. across, tomentose; fls. 1.5 cm. across: fr. apple- (var. *pomifera* Hayne) or pear-shaped (var. *pyrifera* Hayne), yellowish green or brownish, tinged with red. Fl.V; fr.IX–X. R.I.25:t.113(c). G.C.II.1:283;6:649. H.W.3:80, 81(h). B.S.2:296,t(h). M.G.12:376–8(h). (*Pyrus d.* Smith, *Cormus d.* Spach, *Pyrus Sorbus* Gaertn.) S. Eu., N. Afr., W. Asia. Long in cult. Zone V.—Rarely cult., sometimes grown for its fr., used in France and Germany in cider making.

× Sect. Aucuparia × Aria

12. × **S. hýbrida** L. (*S. Aucuparia* × *intermedia*). Tree to 12 m., with ascending brs.; young brts. and petioles floccose-tomentose: lvs. ovate to oblong-ovate or oblong, 7–12 cm. long, with 7–10 pairs of veins below, with 1–4 pairs of oblong decurrent lfts. acute or acutish and serrate toward the apex, the upper part lobed, tomentose beneath; petioles 1.5–3 cm. long: infl. 6–10 cm. across, tomentose; fls. 1 cm. across: fr. subglobose, 1.2 cm. thick, red. Fl.V; fr.IX–X. H.W.3:86. M.A.t.40(h). (*S. fennica* K. Koch, *Pyrus pinnatifida* Ehrh., *P. semipinnata* Bechst.) Scandinavia with the parents. Cult. 1779. Zone IV.—Var. **fastigiàta** Rehd. A form of fastigiate habit. G.C.III.41:185(h). (*P. pinnatifida* var. *fastigiata* Bean.)—Var. **neuillyénsis** Cockerell. A transition to *S. Aucuparia* with 4–5 pairs of distinct lfts. (*S. n.* Dipp.)

A closely related hybrid is **S. thuringíaca** Fritsch (*S. Aucuparia* × *Aria*). Lvs. oblong-ovate, with 9–12 pairs of veins, with 1–3 pairs of distinct lfts., obtusish or rounded at apex with shorter and broader, less pointed teeth, the upper

part lobed at base, very slightly so toward the apex. R.I.25:t.115(c). (*S. hybrida* var. *t.* Rehd., *S. decurrens* Hedl., *Pyrus t.* Ilse, *P. semipinnata* Roth, partly.) This hybrid is less often cult. than the preceding.—An imperfectly known hybrid is **S. plantierénsis** Schneid., supposed to be *S. americana* × *Aria.*

Sect. III. Aria Pers. Lvs. simple, lobed or only serrate: fr. with persistent calyx-lobes.

13. **S. torminàlis** Crantz. Service Tree. Round-headed tree, to 25 m., with spreading brs.; buds glabrous, green; young brts. loosely tomentose: lvs. broad-ovate, slightly cordate to broad-cuneate at base, 5–10 cm. long, with 3–5 pairs of triangular-ovate lobes, the lower sinus reaching about halfway to the middle, bright green, thinly floccose-tomentose beneath when young, usually soon glabrous; petiole 2–5 cm. long: infl. 10–12 cm. across, rather loose, tomentose; fls. 1.2 cm. across; styles usually 2: fr. ellipsoid, about 1.5 cm. long, brown, dotted. Fl.v–vi; fr.ix–x. H.W.3:82(h),t.53(c). S.L.391(h). (*Pyrus t.* Ehrh., *Torminaria t.* Dipp.) Eu., Asia Minor, N. Afr. Long Cult. Zone V.—Ornamental tree with light green handsome lvs. turning bright red in autumn.

S. t. × *Aria* = *S. latifolia;* see No. 14.

Another species with large brown fr. is **S. megalocárpa** Rehd. Shrub to 7 m.: lvs. elliptic-obovate to obovate-oblong, 12–24 cm. long, acuminate, crenate-serrate, glabrous: infl. 10–15 cm. across; styles 3–4, connate, glabrous: fr. ovoid, 1.5–3.5 cm. long, russet-brown. W.China. Intr. 1908. Zone V or VI?

14. × **S. latifòlia** Pers. (*S. Aria* × *torminalis*). Tree to 16 m., similar to the preceding; buds olive-brown, glabrous: lvs. broad-ovate to ovate, usually rounded at base, 6–10 cm. long, pinnately lobed with short broad-triangular, sharply serrate lobes and with 6–9 pairs of veins, grayish or whitish tomentose beneath, rarely glabrescent: infl. 7–10 cm. across, tomentose; fls. 1.5 cm. across; styles 2–3: fr. globose to short-ellipsoid, 1.2 cm. long, orange or brownish red, dotted. Fl.v; fr.ix. Ad.7:t.225(c). H.W.3:85. N.D.4,t.35(c). (*S. decipiens* Hedl., *Torminaria l.* Dipp.) Occasionally with the parents in C. Eu. Intr. before 1750. Zone V.

15. **S. intermèdia** Pers. Shrub or tree to 10 m.: buds greenish or brownish, viscid, the scales with tomentulose margin; young brts. tomentose: lvs. elliptic to obovate-oblong, broad-cuneate, 6–10 cm. long, pinnately lobed, with short and broad irregularly serrate lobes and 5–8 pairs of veins, grayish white or grayish tomentose beneath; petioles 1.5–2 cm. long: infl. 8–10 cm. across, tomentose; fls. 1.2 cm. across; styles usually 2; fr. subglobose, about 1.2 cm. across, orange-red. Fl.v; fr.ix–x. S.E.3:485. S.H.1:f.377s-t(l). B.S.2:285,t(h). (*S. scandica* Fr., *S. minima* Hedl., *Aria suecica* Koehne, *Pyrus i.* Ehrh.) N. Eu. Long cult. Zone V.—This is sometimes confounded with *S. hybrida*, but its lvs. never have distinct lfts. and the sinuses do not reach farther than ⅓ toward the middle.

A closely related species is **S. Mougeòtii** Soy.-Willem. & Godr. Tree to 20 m.: lvs. short-acuminate, with 8–12 pairs of veins, less deeply lobed, whitish tomentose beneath: fr. 8 mm. across, red, edible. H.W.3:83. S.H.1:f.377u-v(l). (*Pyrus M.* Aschers. & Graeb.) Mts. of C. Eu. Cult. 1880. Zone V.—*S. M.* × *chamaemespilus* = *S. Hostii;* see under No. 17.

16. **S. Ària** Crantz. White Beam-tree. Tree with broad-pyramidal or ovoid head, to 15 m.: young brts. tomentose; buds greenish, viscid: lvs. elliptic to elliptic-oblong, acute or obtuse, usually cuneate, 5–12 cm. long, sharply and doubly serrate, glabrous except on the nerves and bright green above, white-tomentose beneath, with 8–12 pairs of veins, leathery; petioles 1–2 cm. long, tomentose: infl. 5–8 cm. across, tomentose; fls. 1.5 cm. across; styles 2, rarely 3, connate at base; fr. subglobose, 1.2 cm. thick, orange-red or scarlet, with mealy flesh. Fl.v; fr.ix–x. H.W.3:t.52(c). G.M.44:291. (*Pyrus*

A. Ehrh., *Aria nivea* Host.) Eu. Long cult. Zone V.—Var. **aùrea** Hesse. Lvs. yellow. A form with deeper yellow lvs. is var. **chrysophýlla** Hesse; a form with yellowish lvs. is var. **lutéscens** Hartwig.—Var. **edùlis** Wenzig. Lvs. elliptic-oblong to oblong, 7–14 cm. long: fr. ovoid, larger. S.H.1:f. 377h-i(l).—Var. **Decaisneana** Rehd. Lvs. elliptic-ovate, 10–15 cm. long, irregularly and double serrate; petiole 2–2.5 cm. long: fls. 1.8 cm. across; stamens longer than style: fr. larger, ovoid. B.M.8184(c). L.I.t.18. (*Aria D.* Lav., *S. Aria majestica* Zabel, *Pyrus Aria* var. *majestica* Prain.) Cult. 1880.—Ornamental tree with handsome lvs. and attractive fr.

For hybrids see Additions and Emendations.

Closely related species are: **S. umbellàta** Fritsch. Tree to 7 m.: lvs. orbicular to broad-elliptic, obtuse, cuneate, 3.5–6 cm. long, incisely lobed above the middle with short rounded coarsely toothed lobes and with 5–6 pairs of veins; petioles usually 1 cm. or less long: fr. depressed-globose. S.H.1:f.379a-d,378f-g. (*S. flabellifolia* F. Schau., *S. meridionalis* Guss., *S. Aria* var. *flabellifolia* Wenz.) S. E. Eu., W. Asia. Intr. before 1830. Zone V or VI?—Var. **crètica** Schneid. Lvs. broad-elliptic or elliptic, 5–9 cm. long, with 6–11 pairs of veins, scarcely lobulate. Gs.3:270. S.H.1:f.379e-i. (*S. graeca* and *S. Aria* var. *graeca* K. Koch.) S. E. Eu. Cult. 1830.—**S. pallescens** Rehd. Lvs. elliptic, doubly denticulate-serrate, grayish-tomentose beneath: infl. small, sessile: fr. subglobose, pale, 8 mm. across. (*S. ochrocarpa* Rehd.) W. China. Intr. 1908. Zone V.—Also related to *S. Aria* are: **S. lanàta** K. Koch. Tree: lvs. elliptic, 10–16 cm. long, sharply and doubly serrate and slightly lobed, grayish villous-tomentose beneath, later often glabrescent; styles 2–3, woolly below; sepals nearly glabrous outside; petals narrowed into a claw: fr. globose, 1.5–3 cm. across. S.H.1:f.383a-b,380o-p. (*Pyrus kumaonensis* Wall.) Cult. 1870. Zone VII or VIII. Doubtful if now in cult.—**S. cuspidàta** Hedl. Tree; lvs. elliptic to elliptic-oblong, acuminate, 7–16 cm. long, doubly serrate, densely white-tomentose beneath: infl. 8–10 cm. across; styles usually 5, distinct: fr. subglobose, about 2 cm. across, reddish. B.M.8259(c). B.R.1655(c). G.C.II.1:17. (*Pyrus vestita* Wall., *Cormus lanata* Koehne, *S. nepalensis* Hort.) Himal. Intr. 1820. Zone VII.—One of the handsomest species of the Ariagroup.

17. **S. chamaemèspilus** Crantz. Shrub to 3 m.; young brts. loosely pubescent: buds glabrous, with ciliate scales: lvs. elliptic to oblong, acute, cuneate, 3–7 cm. long, serrate, glabrous beneath or slightly floccose-tomentose, with 6–9 pairs of veins; petioles 4–10 mm. long: infl. dense, about 3 cm. across, tomentose; petals pink, upright, gradually narrowed into the claw; styles 2: fr. ovoid, red. Fl.vi; fr.ix–x. H.W.3:84. S.O.2:t.87(c). G.H.t.70. (*Pyrus c.* Ehrh., *Aria c.* Host.) C. & S. Eu. Intr. 1683. Zone V.—Var. **sudètica** Wenz. Lvs. to 10 cm. long, grayish tomentose beneath, (*S. s.* Nym., *Pyrus s.* Tausch, *S. chamaemespilus* var. *discolor* Neilr., not Hegtschw.) C. Eu. Cult. 1908. Possibly *S. Aria* × *chamaemespilus*.

S. c. × *Mougeotii* = **S. Hostii** Hedl. Shrub to 4 m.: lvs. elliptic to elliptic-obovate, sharply serrate, loosely tomentose beneath: fls. whitish pink, in corymbs to 6 cm. across: fr. globose-ovoid. S.O.4:t.193(c). S.H.1:f.381a-b. (*Aria Hostii* Jacq.) C. Eu. with the parents. Cult. 1820. Zone V.

Sect. IV. Micromeles Rehd. Lvs. simple: fr. small, with deciduous calyx.

18. **S. alnifòlia** K. Koch. Tree to 20 m., with upright brs.: brts. glabrous or slightly pubescent: lvs. ovate to elliptic-ovate, short-acuminate, rounded at base, 5–10 cm. long, unequally serrate, glabrous above, glabrous or slightly pubescent beneath, on vigorous shoots sometimes pubescent, with 6–10 pairs of veins: infl. loose, 6–10-fld., nearly glabrous; fls. 1 cm. across; styles usually 2: fr. subglobose, 8 mm. across, red and yellow. Fl.v; fr.ix–x. B.M.7773(c). S.I.1:t.49(c). G.F.7:84. Gt.41:283, 284. (*Micromeles a.* Koehne, *Pyrus Miyabei* Sarg.) C. China to Korea and Jap. Intr. 1892. Zone V.—Ornamental small tree with dense round head and handsome bright green lvs. turning orange and scarlet in autumn.

Related species are: **S. caloneùra** Rehd. Shrub or tree to 6 m.: lvs. elliptic-oblong to obovate-oblong, usually acute, cuneate, doubly crenate-serrate, with 10–12

pairs of veins: infl. dense, many-fld.; styles 5: fr. pyriform, 1 cm. long, brown. B.M.8335(c). (*Pyrus c.* Veitch, *Micromeles c.* Stapf.) C. China. Intr. 1904. Zone V.—**S. meliosmifolia** Rehd. Tree to 10 m.: lvs. short-petioled, ovate to elliptic-oblong, 10–18 cm. long, doubly serrate, with 18–24 pairs of veins: infl. 5–10 cm. across: fr. subglobose, brownish red. W. China. Intr. 1910? Zone VI?— **S. Keissleri** Rehd. Tree to 12 m.: lvs. elliptic-obovate, 5–8 cm. long, crenate-serrulate, with 8–10 pairs of veins: infl. tomentose; styles usually 3, connate below: fr. ovoid, red. (*S. Decaisneana* Rehd., not Zabel, *Micromeles D.* Schneid.) C. & W. China. Intr. 1900? Zone VI?

20. **S. Fólgneri** Rehd. Tree with spreading and arching brs., to 8 m.; young brts. tomentose: lvs. ovate to elliptic-ovate, acute or short-acuminate, broad-cuneate or rounded at base, 5–8 cm. long, finely serrate or on shoots doubly serrate and often slightly lobed, dark green and glabrous above, white-tomentose beneath, with 8–9 pairs of veins; infl. many-fld., about 10 cm. across; styles 3: fr. ellipsoid, about 1.3 cm. long, red. Fl.v; fr.x. M.G.27: 136(h). (*Micromeles F.* Schneid., *Pyrus F.* Bean.) C. China. Intr. 1901. Zone V.—Var. **péndula** Rehd. Brts. pendulous.—A very handsome and graceful species.

A closely related species is **S. Zahlbrúckneri** Schneid., but lvs. becoming glabrescent in autumn and the fr. with small persistent calyx-lobes. S.H.1:f.379v(l). C. China. Intr. 1901? Zone V.

21. **S. japónica** Hedl. Tree to 20 m.; young brts. tomentose: lvs. ovate to oblong-ovate, short-acuminate, cuneate, 7–10 cm. long, doubly serrate and lobulate, pubescent above or sometimes glabrescent, grayish white or white-tomentose beneath, with 10–12 pairs of veins; petioles 1–2 cm. long: infl. tomentose, rather dense: fr. ellipsoid, 1.2 cm. long, scarlet, punctulate. Fl.v; fr.x. S.I.1:t.48(c). (*Micromeles j.* Koehne, *S. Kochnei* Zabel, *S. Aria* var. *kamaonensis* Maxim.) Japan, Korea. Intr.? Zone V.—Var. **calocárpa** Rehd. Lvs. with purer white denser tomentum beneath, to 8 cm. broad: fr. orange, 1.5 cm. long, not punctulate. C. Japan. Intr. 1915. Zone V.— Ornamental tree, particularly the var. with its handsome lvs. white beneath and changing to yellow in autumn and with its bright orange fr.

× **SORBARÒNIA** Schneid. Hybrids between Sorbus and Aronia and intermediate between the two genera. Deciduous shrubs with partly pinnate or simple, serrulate lvs., rather small and dense infl., 3–4 styles and red or nearly black fr.

A. Lvs. partly pinnate or lobed ..... 1. *S. hybrida*
AA. Lvs. serrulate ..... 2. *S. alpina*

1. × **S. hýbrida** Schneid. (*Sorbus Aucuparia* × *Aronia arbutifolia*). Shrub or small tree, with slender, sometimes pendulous brs.; young brts. tomentose: lvs. ovate to oblong-ovate, obtuse, 3–8 cm. long, with 2–3 pairs of lobes or lfts. near base, crenate-serrate toward the apex, pubescent beneath: infl. about 3 cm. across, pubescent or nearly glabrous; fls. white or pinkish white: fr. subglobose or pear-shaped, 8–10 mm. long, dark purple. B.R.1196(c). S.H.1:f.348k-n(l). (*Pyrus h.* Moench, *Aronia h.* Zab., *P. heterophylla* Dur., *Sorbus spuria* Pers., *Sorbaronia heterophylla* Schneid.) Orig. before 1785. Zone V.

Similar hybrids are: **S. fallax** Schneid. (*S. Aucuparia* × *A. melanocarpa.*) Similar, but nearly glabrous and fr. blackish. (*S. heterophylla* Dipp., not Reichenb., *Aronia heterophylla* Zabel.) Cult. 1878.— × **S. sorbifòlia** Schneid. (*S. americana* × *A. melanocarpa*). Similar, but lvs. more pointed and like the infl. glabrous: fr. nearly black. (*Sorbus s.* Hedl., *Sorbus Sargentii* Dipp.) Cult. 1893.

2. × **S. alpìna** Schneid. (*Sorbus Aria* × *A. arbutifolia*). Shrub similar to *S. Aria,* but lvs. smaller, glandular-serrulate, with fewer and less straight veins: infl. and fls. smaller; styles 3–4: fr. red or brownish red, 8 mm. across.

S.H.1:f.385f-h(l). (*Pyrus a.* Willd., *Sorbus a.* Heynh., *Aronia densiflora* Spach, *A. Willdenowii* Zabel.) Orig. before 1809. Zone V.

A similar hybrid is **S. Dippélii** Schneid. (*S. Aria* × *A. melanocarpa*). Similar, but lvs. and infl. finally glabrous: fr. blackish purple. (*Sorbus D.* Zabel.) Cult. 1870.

× **SORBOPŸRUS** Schneid. Hybrids between Pyrus and Sorbus known so far only between *P. communis* and *S. Aria*. (*Bollwilleria* Zabel.)

× **S. auriculàris** Schneid. (*Pyrus communis* × *Sorbus Aria*). Tree to 15 cm.; brts. and buds tomentose: lvs. broad-elliptic to elliptic, short-acuminate, usually rounded at base, 6–10 cm. long, irregularly and coarsely serrate or doubly serrate, pubescent beneath: fls. in 5–many-fld. corymbs; pedicels slender; calyx tomentose, styles 2–5: fr. pyriform, about 2.5 cm. across, greenish or reddish yellow. Fl.v; fr.x. B.R.1437(c). L.B.1009(c). B.S.2: 278. S.L.347(h). (*Pyrus a.* Knoop, *P. Pollveria* L., *P. Bollwylleriana* DC., *Sorbus Bollwylleriana* Zabel, *Bollwilleria a.* Zabel.) Orig. before 1620. Zone V.—Var. **bulbifórmis** Schneid. Nearer to Pyrus: fr. larger, to 4 cm. across. Wien. Obst-Gart.-Zeit.1878:26.

A supposed hybrid of *Sorbus Aria* with a species of Malus is **S. malifolia** Schneid. (*Bollwilleria m.* Zabel.) Orig. 1889. Unknown to me.

× **AMELASÓRBUS** Rehd. Hybrid between *Amelanchier* and *Sorbus*; from the former it differs chiefly in the partly incompletely pinnate lvs. and in the paniculate infl., from the latter in the partly simple, partly incompletely pinnate or lobed lvs., the paniculate infl., the oblong petals, the usually 5 styles and the incompletely 8- or 10-celled fr.

× **A. Jáckii** Rehd. (*Amelanchier florida* × *Sorbus sitchensis*). Vigorous shrub: lvs. oval to elliptic, 3.5–6 cm. long, or on shoots to 10 cm. long and elliptic-oblong, rounded or acutish at apex, subcordate or rounded at base, coarsely dentate and partly pinnate or lobed below the middle, loosely pubescent at first, soon glabrous: infl. to 5 cm. long, with racemose brs.; petals oblong, 1 cm. long; styles 4–5: fr. subglobose, 6–8 mm. across, dark red, with blue bloom; false partitions extending about halfway to the middle. Idaho. Intr. 1918. Zone V.

19. **ARÒNIA** Pers. Chokeberry. Deciduous shrubs; buds appressed, with about 3 outer scales: lvs. crenate-serrulate, with blackish glands on the midrib above, convolute in bud; stipules small, deciduous: fls. white or pinkish, in small corymbs; petals spreading; stamens numerous; anthers purple; ovary 5-celled, woolly at the top; styles 5, connate at base; carpels connate, but partly free on their ventral suture: fr. a small pome without grit-cells, with persistent connivent calyx-lobes. (Derived from the generic name Aria.) Syn.: *Adenorhachis* Nieuwl. Three closely related species in N. Am.—Ornamental shrubs with handsome lvs. and attractive white fls. and decorative fr.

A. Lvs. beneath and infl. pubescent.
B. Fr. red.....1. *A. arbutifolia*
BB. Fr. purple-black or dark purple.....2. *A. floribunda*
AA. Lvs. and infl. glabrous or nearly so: fr. black.....3. *A. melanocarpa*

1. **A. arbutifòlia** Elliott. Red Chokeberry. Shrub to 3 m.; brts. tomentose: lvs. elliptic to oblong or obovate, acute or abruptly acuminate, glabrous above except the midrib, grayish tomentose beneath: infl. tomentose, 3–4 cm. broad, rather dense, 9–20-fld.; fls. about 1 cm. across, white or reddish: calyx-lobes glandular: fr. subglobose or pear-shaped, 5–7 mm. across, bright or dull red. Fl.iv–v; fr.ix–x, long persistent. B.M.3668(c). G.F.3:417.

G.W.5:245. (*Pyrus a.* L. f., *Sorbus a.* Heynh., *Mespilus a.* var. *erythrocarpa* Mich.) Mass. to Fla., w. to Minn., Ohio, Ark. and Tex. Intr. about 1700. Zone V.—Ornamental shrub with bright red fr. in autumn persisting through the winter; the foliage turns red in autumn.—Var. **macrocárpa** Zabel. Fr. larger, 8–10 mm. across.—Var. **pùmila** Rehd. Dwarf shrub with smaller lvs. and darker red fr. S.O.2:t.89(c). (*Mespilus pumila* Schmidt, *Pyrus depressa* Lindl.)

A. a. × *Sorbus aucuparia* = *Sorbaronia hybrida;* see p. 383.—*A. a.* × *Sorbus Aria* = *Sorbaronia alpina;* see p. 383.

2. **A. floribúnda** Spach. Purple-fruited C. Shrub to 4 m. similar to the preceding; corymbs looser, calyx often less densely tomentose and calyx-lobes glandless or nearly so: fr. subglobose, 8–10 mm. across, purplish black, lustrous. Fl.iv–v; fr.viii–ix. Ad.3:t.81(c). B.R.1006(c). B.B.2:291. (*A. atropurpurea* Britt., *Sorbus arbutifolia* var. *atropurpurea* Schneid., *Pyrus f.* Lindl., *P. arbutifolia* var. *atropurpurea* Robins.) N. S. to Fla., w. to Ind. Cult. 1800? Zone IV.—Handsome shrub intermediate between the preceding and the following, but not a hybrid, though hybrid forms may exist which can not be distinguished from this species.

3. **A. melanocárpa** Elliott. Black C. Usually low shrub, 0.5–1 m. tall; brts. nearly glabrous: lvs. elliptic or obovate to oblong-oblanceolate, abruptly acuminate or obtusish, 2–6 cm. long, bright green and glabrous or nearly so beneath: infl. glabrous or nearly so: fr. globose, 6–8 mm. across, lustrous black or black-purple. Fl.iv–v; fr.viii–ix. B.M.9052(c). B.B.2:291. D.H.3:385. (*A. nigra* Dipp., *Sorbus m.* Heynh., *Pyrus m.* Willd.) N. S. to Fla., w. to Mich. Intr. about 1700. Zone III? or IV.—Var. **subpubéscens** Schneid. Lvs. pubescent beneath when young.—Var. **elàta** Rehd. More vigorous shrub, to 3 m.: lvs. larger, generally oblong-obovate and acute: fls. and fr. larger.—Var. **grandifòlia** Schneid. Shrub to 3 m.: lvs. obovate to broad-obovate and abruptly acuminate, 4–8 cm. long and 2–6 cm. broad: infl., fls. and fr. larger. B.R.1154(c).—Particularly the two last vars. are handsome shrubs with lustrous dark green lvs., attractive white fls. in spring and shining black fr. in autumn, but shriveling and dropping before the winter.

A. m. × *Sorbus americana* = *Sorbaronia sorbifolia;* see p. 383.—*A. m.* × *Sorbus aucuparia* = *Sorbaronia fallax;* see p. 383.—*A. m.* × *Sorbus Aria* = *Sorbaronia Dippelii;* see p. 384.

20. **PHOTÌNIA** Lindl. Deciduous or evergreen shrubs or trees; buds ovoid, with several outer scales: lvs. short-petioled, usually finely serrate, stipulate: fls. white, in corymbs or short panicles; petals 5, orbicular; stamens about 20; styles 2, rarely 3–5, connate at least at base; ovary often nearly half-superior, in fr. free only at apex or ⅓ of its length: fr. a small, 1–4-seeded pome, red, rounded at top and with persistent connivent calyx-lobes. (Greek *photeinos*, shining; alluding to the lustrous lvs.) Including *Pourthiaea* Dcne. About 40 species, in S. and E. Asia.

A. Lvs. deciduous: fls. in corymbs or cymes, with conspicuously warty axes. (Sect. I. Pourthiaea Schneid.)
B. Infl. compound, many-fld. ..... 1. *P. villosa*
BB. Infl. subumbellate, 2–8-fld., glabrous ..... 2. *P. subumbellata*
AA. Lvs. persistent: infl. corymbose-paniculate, not warty. (Sect. II. Euphotinia Focke.) 3. *P. serrulata*

1. **P. villòsa** DC. Shrub or small tree, to 5 m.; brts. slender, pubescent when young: lvs. short-stalked, broad-obovate to oblong-obovate, 3–8 cm. long, acuminate, cuneate, finely and sharply serrate, dark green and glabrous above, villous beneath, with 5–7 pairs of veins, firm at maturity; petioles 1–5 mm. long: infl. 3–5 cm. across, villous; fls. 1.2 cm. across: fr. ellipsoid,

8 mm. long, bright red. Fl.VI; fr.x. S.I.1:t.49(c). G.F.1:67. (*P. variabilis* Hemsl., *Pourthiaea v.* Dene., *Sorbus v.* Zabel.) Japan, Korea, China. Intr. about 1865. Zone V.—Var. **laèvis** Dipp. Lvs. narrower and smaller, soon glabrous: infl. glabrous: fr. 1.2 cm. long. G.F.4:377. B.C.2596. (*P. l.* DC., *Pourthiaea arguta* Lav., not Decne.) Cult. 1875.—Var. **sínica** Rehd. & Wils. Shrub or tree to 10 m.: lvs. thinner, elliptic or elliptic-oblong, soon glabrous: infl. 5–8-, rarely to 15-fld., loosely villous. C. China. Intr. 1908.—Ornamental shrubby tree, with bright red fr. persisting into the winter; the lvs. turn red in autumn.

A closely related species is **P. Beauverdiàna** Schneid. Lvs. obovate-oblong to oblong, 6–10 cm. long, glabrous, with 8–14 pairs of veins; petioles 5–10 mm. long: infl. 5 cm. across: fr. subglobose, 6 mm. across, scarlet. S.H.1:f.393p-q(l). C. and W. China. Intr. 1900? Zone VI?—Var. **notàbilis** Rehd. & Wils. Lvs. elliptic-oblong, 7–12 cm. long: infl. 8–10 cm. across: fr. ellipsoid, 7–8 mm. long. Intr. 1908.

2. **P. subumbellàta** Rehd. & Wils. Slender-branched shrub to 3 m.; brts. glabrous: lvs. very short-stalked, elliptic-ovate to rhombic-ovate, acuminate, broad-cuneate or rounded at base, 3–6 cm. long, glabrous, pale or glaucescent beneath: pedicels 1–2.5 cm. long: fr. ellipsoid, 1 cm. long, scarlet. Fl.v–VI; fr.x. C. China. Intr. 1908. Zone V.

P. parvifòlia Rehd. & Wils. is closely related. Shrub to 2 m.: lvs. elliptic, long-acuminate, 3–5 cm. long: fls. 2–3, on very slender pedicels 2–5 cm. long: fr. 8 mm. long. S.H.1:f.392o-o¹(fl). C. China. Intr. 1908. Zone V?—A less closely related species is **P. amphidòxa** Rehd. & Wils. Shrub to 3 m.; young brts. tomentose: lvs. elliptic to oblong or oblong-oblanceolate, acuminate, 5–9 cm. long, finally nearly glabrous: infl. 3–6-fld., tomentose; pedicels short; styles 5: fr. subglobose, 1–1.4 cm. across, scarlet. S.H.1:f.394k-l(fl). (*Stranvaesia a.* Schneid.) C. China. Intr. 1908. Zone VII?

3. **P. serrulàta** Lindl. Evergreen shrub or tree to 12 m., quite glabrous; buds ovoid, 4 mm. thick: lvs. oblong, acuminate, usually rounded at base, 10–18 cm. long, serrulate, dark green and lustrous above, yellowish green beneath, reddish when young; petioles 2–3 cm. long, pubescent: fls. 6–8 mm. across, in broad panicles 10–16 cm. across, with thick slightly angular brts.; petals glabrous: fr. globose, 5–6 mm. across, red. Fl.v–VII; fr.x. B.M. 2105(c). L.B.248(c). G.W.15:247(h). (*Crataegus glabra* Lodd., not Thunb.) China. Intr. 1804. Zone VIII.—Evergreen ornamental shrub with handsome large and lustrous lvs. and attractive white fls. in spring, followed late in autumn by bright red fr.

A closely related species is **P. Davidsòniae** Rehd. & Wils. Buds about 1 mm. thick, acutish: young brts. appressed-pubescent: lvs. cuneate, 8–14 cm. long, pubescent on the veins beneath at first; petioles 1–1.5 cm. long: fls. 1 cm. across; infl. slightly pubescent: fr. 7–10 mm. long. C. China. Intr. 1900. Zone VII or VIII. —Another related species is **P. glabra** Maxim. Shrub to 3 m.: lvs. elliptic or obovate to oblong-obovate, cuneate, 5–8 cm. long; petiole about 1 cm. long: infl. 5–10 cm. across; petals bearded: fr. about 5 mm. across. S.I.1:t.47(c). (*Crataegus g.* Thunb., *Sorbus g.* Zabel.) Japan. Intr. ? Zone VIII.

21. **STRANVAÈSIA** Lindl. Evergreen trees or shrubs; buds small, with few acuminate scales: lvs. entire or serrate, with subulate stipules: fls. white, in terminal many-fld. corymbs; calyx turbinate, 5-toothed; petals 5, generally obovate, clawed; stamens about 20; styles 5, connate at least to the middle; ovary half-superior; cells 2-ovuled: fr. a small orange or scarlet pome; calyx-teeth persistent, connivent; upper part of ovary free to the middle or beyond, the whole ovary at full maturity easily separable from the fleshy receptacle and the valves splitting loculicidally. (After William Fox-Strangways, English botanist; 1795–1865.) Four or 5 species in China and the Himal.

S. **Davidiàna** Dene. Shrub to 8 m.; young brts. silky-villous, soon glabrous:

lvs. oblong to oblong-lanceolate or oblanceolate, acuminate, cuneate, 6–11 cm. long, entire, green and glabrous on both sides except the sparingly pubescent midrib; petiole pubescent, 1–2 cm. long, often red: infl. loose, 5–8 cm. broad, villous: fls. 8 mm. across; anthers red: fr. subglobose, 7–8 mm. across, scarlet. Fl.VI; fr.X–XI. B.M.9008(c). M.O.t.19. G.C.III.71:199(h). (*Photinia D.* Cardot.) W. China. Intr. 1917. Zone VII or VIII.—Var. **undulàta** Rehd. & Wils. Usually lower: lvs. elliptic-oblong to oblong-lanceolate, 3–8 cm. long, usually wavy at the margin: infl. 5–7 cm. across, sometimes nearly glabrous: fr. about 6 mm. across, orange. B.M.8418(c). Gn.86:644. (*S. u.* Dene.) W. and C. China. Intr. 1901. Zone VI or VII.—Var. **salicifòlia** Rehd. Lvs. narrow-lanceolate, with more numerous veins; stipules and bracts quickly deciduous: infl. densely pubescent: fr. red, about 8 mm. across. B.M.8862(c). Gn.87:No.2717;88:57(h). (*S. s.* Hutchins.) W. China. Intr. 1907. Zone VII?

S. nússia Decne. (*S. glaucescens* Lindl.) from the Himal. with serrulate lvs. is apparently not hardy within our area.

22. **ERIOBÓTRYA** Lindl. Evergeen trees or shrubs: lvs. short-petioled or nearly sessile, dentate, with straight veins ending in the teeth: fls. white in terminal broad usually woolly panicles; calyx-lobes acute; petals 5, oval or suborbicular, clawed; stamens 20; styles 2–5, connate below; ovary inferior; cells 2-ovuled: fr. a pome with incurved persistent calyx-teeth, thin endocarp and one or few large seeds. (Greek, *erion*, wool, and *botrys*, cluster.) About 10 species in E. Asia.

E. japónica Lindl. LOQUAT. Small tree to 6 m.; lvs. nearly sessile, obovate to elliptic-oblong, cuneate, 12–25 cm. long, remotely dentate, lustrous above, rusty-tomentose below: fls. fragrant, about 1 cm. across, nearly hidden in the rusty woolly pubescence of the panicle 10–16 cm. long: fr. pear-shaped, 3–4 cm. long, yellow; seeds 1–1.5 cm. long. Fl.IX–X; fr.IV–VI. S.Z.1:t.97(c). B.R.365(c). G.C.III.52:319. R.H.1913:107(fr). Gn.80:615(h). G.W.8:314 (h). C. China. Intr. 1784. Zone (VII) VIII.—Var. **variegàta** Sander. Lvs. variegated with white. G.C.III.53:293.—Evergreen tree with handsome large lvs., fragrant rather inconspicuous fls. and yellow edible fr. of agreeable acid flavor, for which the plant is cult. in E. Asia, S. Eu. and in the S. States.

23. **RAPHIÓLEPIS** Lindl. Evergreen shrubs: lvs. short-petioled, serrate or entire, with curving and anastomosing veins, leathery: fls. white or pink, in terminal racemes or panicles; sepals triangular; petals 5, oblong to obovate, obtuse; stamens 15–20; styles 2–3 connate at base; ovary inferior: fr. subglobose, purple-black or bluish black, with deciduous calyx and with 1 or 2 large seeds. (Greek, *rhaphe*, needle and *lepis*, scale; in reference to the subulate bracts.) Three or four species in S. Japan and S. China.

R. umbellàta Mak. Shrub to 4 m.: lvs. elliptic to obovate, rarely elliptic-oblong, obtuse or acute, cuneate, 3–8 cm. long, remotely dentate, dark green above, pale beneath and floccose-tomentose when young: fls. white, 1.5–2 cm. across, fragrant in dense upright tomentose panicles or racemes: fr. about 1 cm. across, bluish black. Fl.V–VI; fr.IX(–III). S.Z.1:t.85(c). (*R. japonica* Sieb. & Zucc.) S. Japan. Intr. before 1859. Zone VIII?—Var. **ovàta** Schneid. Lvs. broad-obovate, rounded at apex, entire or sparingly toothed. B.M. 5510(c). R.H.1870:348. G.W.4:129(h);14:323(h). (*R. japonica* var. *integerrima* Hook. f., not Maxim.) Japan, Korea. Intr. before 1864.—Handsome evergreen shrub with fragrant white fls.

A species which may be hardy in zone VIII is **R. índica** Lindl. Lvs. thinner and narrower, acute or acuminate, more sharply serrate: fls. white or pinkish in

loose glabrous or somewhat tomentose racemes with narrow lanceolate bracts; sepals lanceolate, acute and usually red; petals narrow, acute. B.M.1726(c). B.R.1400, 1468(c). S. China. Intr. 1806.—A hybrid between the two species is **R. Delacoùrii** André. R.H.1900:698,t(c).

24. **AMELÁNCHIER** Med. SHADBUSH. Deciduous shrubs or trees: buds conspicuous, pointed, with several scales: lvs. petioled, serrate, with nearly straight veins; stipules small, deciduous: fls. white, in terminal racemes, rarely solitary; calyx-tube campanulate, with 5 short lobes; petals 5, obovate to lanceolate; stamens 10–20; styles 2–5, partly connate or distinct; ovary inferior, each cell with 2 ovules separated by a false partition growing from the back of the cell; fr. a small berry-like pome, incompletely 4–10-celled, with one seed in each cell, crowned by the usually reflexed calyx-lobes, bluish black or dark purple, usually juicy and sweet. (Supposed to be a Savoy name.) About 25 species chiefly in N. Am. s. to Mex., few in Eu. and in W. and E. Asia.

All are ornamental trees and shrubs, very handsome when in bloom, particularly *A. laevis;* some of them as Nos. 3–7 and 10 have edible fr. sometimes used for jellies and are occasionally cult. for their fr.

Styles free, 5, not exceeding the calyx-tube.....1. *A. ovalis*
Styles connate at least at base, longer than calyx-tube.
A. Styles 5, often connate to the middle.
B. Fls. in racemes: lvs. folded in bud; petioles slender.
C. Lvs. rather coarsely serrate, 3–5 teeth per cm. on average lvs.; veins usually straight and close together; young unfolding lvs. soon flat: top of ovary woolly.
D. Lvs. rounded or truncate at apex, usually serrate above the middle, glabrous or soon glabrous.....2. *A. florida*
DD. Lvs. acute or acutish, densely woolly beneath when young.
E. Shrub to 3 m.: lvs. serrate nearly to the base.....3. *A. sanguinea*
EE. Shrub to 1.25 m.: lvs. serrate to below the middle.....4. *A. humilis*
CC. Lvs. closely and finely serrate, about 6–12 teeth per cm.; young lvs. remaining folded for some time.
D. Lvs. tomentose when young; pedicels usually rather short.
E. Lvs. rounded or acutish at apex.
F. Top of ovary woolly: lvs. generally elliptic.
G. Sepals on fr. recurved: stoloniferous shrub to 1.25 m.....5. *A. stolonifera*
GG. Sepals on fr. slightly spreading: shrub to 4 m.....6. *A. spicata*
FF. Top of ovary glabrous or nearly so: lvs. generally oblong; sepals upright.
7. *A. oblongifolia*
EE. Lvs. short-acuminate or acute.
F. Top of ovary woolly: lvs. glabrous above when young, rounded or subcordate at base.....8. *A. asiatica*
FF. Top of ovary glabrous or nearly so: lvs. tomentose on both sides when young, usually cordate at base.....9. *A. canadensis*
DD. Lvs. glabrous from the beginning: pedicels slender, to 2.5 or in fr. to 5 cm. long.
10. *A. laevis*
BB. Fls. 1–3: lvs. imbricate in bud, flat when unfolding, cuneate at base; petioles short.
11. *A. Bartramiana*
AA. Styles 2–3, usually connate only at base.....12. *A. prunifolia*

1. **A. ovàlis** Med. SERVICE-BERRY. Upright or spreading shrub, 0.5–2.5 m., with rather stiff brs.; young brts. tomentose: lvs. oval to obovate, 2.5–5 cm. long, usually rounded at apex, subcordate at base, serrate from near the base, woolly beneath when young: racemes many-fld., tomentose; calyx glabrescent; petals linear-oblanceolate: fr. bluish black, bloomy. Fl.v; fr.VIII. B.M.2430(c). H.W.3:87. G.C.II.9:793. M.G.1900:497(h). (*A. Amelanchier* Sarg., *A. rotundifolia* Dum.-Cours., *A. vulgaris* Moench.) C. and S. Eu. Intr. 1596. Zone IV or V.

2. **A. flòrida** Lindl. Shrub with rather stout upright brs., sometimes small tree to 5 m.: lvs. broad-oval to oval, truncate or subcordate at base, 2–4 cm. long, coarsely and sharply toothed above the middle, rarely below, quite glabrous or slightly floccose-tomentose at first; racemes many-fld., upright, glabrous or slightly tomentose at first; sepals short; petals oblong to narrow-oblong, about 1 cm. long; summit of ovary woolly: fr. nearly black, bloomy. Fl.v; fr.VII. B.R.1589(c). S.S.4:t.196. G.F.185:5:515. G.M.52:143(h). (*A.*

alnifolia var. *f.* Schneid., *A. alnifolia* Auth., not Nutt., *A. cxyodon* Koehne.) Mich. to Ore. and Wash. Intr. 1826. Zone I.

A. f. × *Sorbus sitchensis* = *Amelasorbus Jackii;* see p. 384.

A closely related species is **A. alnifòlia** Nutt. Usually low and shrubby; brts. pubescent: lvs. broad-oval to suborbicular, densely pubescent beneath, finally glabrate; racemes rather short and dense, silky-villous. Sask. to Colo. and Idaho. Intr. 1918. Zone V.

3. **A. sanguínea** DC. Slender shrub with 1 or few stems, to 2.5 m.: lvs. orbicular-oval to oval-oblong, 3–6 cm. long, subacute, rounded or subcordate at base, serrate nearly to base: raceme usually loose and nodding; lower pedicels 7–10, in fr. to 25 mm. long; petals 1–1.4 cm. long; calyx-tube 3.5–6 mm. broad; top of ovary densely woolly; fr. rather large, nearly black, bloomy, sweet. Fl.v; fr.VIII. B.B.2:283. Rhodora,14:t.95. (*A. rotundifolia* Roem., *A. spicata* Robins. & Fern., not K. Koch.) Can. to N. Y., Neb. and Ind. Intr. 1824. Zone IV.

A closely related species is **A. amàbilis** Wieg. Lvs. elliptic-ovate, with veins more irregular, glabrescent: infl. loose; lower pedicels 2.5–4 cm. long; calyx-tube more shallow, 7–9 mm. broad; petals 1.6–2.2 cm. long. (*A. sanguinea* var. *grandiflora* Wieg., *A. grandiflora* Wieg., not Rehd.) N. Y. Intr. 1913.

4. **A. hùmilis** Wieg. Upright shrub, to 1.25 m., stoloniferous and forming patches: lvs. elliptic to elliptic-oblong, subcordate or rarely rounded at base, 2–5 cm. long, serrate to below the middle; racemes upright, rather dense, many-fld.; petals oblong-obovate, about 8 mm. long: fr. nearly black, bloomy, sweet. Fl.v; fr.VIII. Rhodora,14,t.95. Vt. to Alb., s. to N. Y. and Iowa. Intr. 1904. Zone IV.

5. **A. stolonífera** Wieg. Upright stoloniferous shrub to 1.25 m., forming patches: lvs. elliptic, rarely elliptic-oblong or suborbicular, rounded at base or rarely subcordate, 2–5 cm. long, finely serrate, usually quite or nearly entire at the lower third, densely white-tomentose beneath when young: racemes upright, short and densely tomentose or nearly glabrous; petals obovate-oblong, about 8 mm. long: fr. purplish black, bloomy, sweet. Fl.v, a few days later than *A. laevis*; fr.VII. Rhodora,14,t.95. (*A. spicata* Britt. & Br., not K. Koch.) Nfdl. and Me. to Va. Intr. 1883. Zone IV.

6. × **A. spicàta** K. Koch (*A. oblongifolia* × *stolonifera*?). Bushy shrub with numerous stems, to 4 m.: lvs. elliptic to obovate, sometimes elliptic-oblong, rounded at base, 3–6 cm. long, serrate to the base, white tomentose beneath when young; racemes upright, dense woolly; petals oblong-obovate, 8 mm. long: fr. bluish black, bloomy, with slightly spreading sepals; pedicels rather stout, 3–12 mm. long. G.O.t.79(c). M.G.15:496(h,fl). (*Crataegus s.* Lam., *A. ovalis* Borkh., not Med.) Orig. before 1800.

7. **A. oblongifòlia** Roem. Shrub with rather slender upright stems growing in rather dense clumps, to 8 m.: lvs. oblong to obovate-oblong, rounded or acute at apex, usually rounded at base, 3–6 cm. long, finely serrulate nearly or quite to the base, white-tomentose beneath when young: racemes upright, short and dense, silky-tomentose; petals obovate-oblong to linear-oblanceolate, about 8 mm. long; top of ovary glabrous or sometimes slightly woolly: fr. nearly black, bloomy, sweet. Fl.v, with *A. laevis*; fr.VI. B.M.7619(c). Em.2:503,t(c, lower fig.) S.S.4:t.195. G.C.III.21:333. S.L.96(h). M.G.15: 497(h). (*A. canadensis* var. *o.* Torr. & Gr., *A. obovalis* Ashe, *A. Botryapium* Britt. & Brown in part.) Me. to S. C. Intr. 1800. Zone IV.—This differs from all other species except Nos. 6 and 11 in the upright sepals of the fr.—Var. **micropétala** Robins. Shrub to 1 m.: fls. inconspicuous, with linear petals 3–4 mm. long. (*A. m.* Ashe; possibly *A. o.* × *stolonifera.*) Mass. to Va. Intr. 1918.

A closely related species is **A. intermèdia** Spach. Usually low shrub: lvs. acute, often reddish when young, soon glabrous, those of shoots similar to lvs. of *A. laevis;* sepals irregularly spreading; pedicels slender, 8–20 mm. long. (*A. canadensis i.* Ashe.) Vt. to N. C. Cult. 1834. Zone V.

8. **A. asiática** Endl. Shrub or tree to 12 m., with slender spreading brs.; lvs. ovate to elliptic-oblong, acute, rounded at base or subcordate, 4–8 cm. long, finely serrate to the base, densely white or yellowish tomentose beneath when young: racemes nodding, rather dense, woolly; top of ovary woolly: fr. bluish black. Fl.v; fr.ix. S.Z.1:t.42(c). S.I.1:t.47(c). (*A. canadensis* var. *a.* Miq., *A. japonica* Hort.) Japan, Korea. Intr. 1865. Zone V.—Var. **sínica** Schneid. Lvs. less tomentose, often finally glabrous, smaller, usually serrate only above the middle: infl. usually glabrous. C.C.169. (*A. s.* Chun.) China. Intr. 1920.

9. **A. canadénsis** Med. Bushy tree to 10 m., with ascending brs., sometimes shrubby: lvs. generally obovate, less often ovate, elliptic or oblong, acute to acuminate, usually cordate at base, 3–8 cm. long, sharply serrate nearly or quite to the base, when young densely tomentose beneath, less so above, tomentum usually partly persistent: racemes nodding, rather dense, silky-tomentose; petals linear to linear- oblong, 1–1.4 cm. long; top of ovary glabrous or slightyly hairy: fr. maroon-purple, tasteless. Fl.v, before the lvs.: fr.vi. B.R.1174(c). S.S.4:t.194. Rhodora 14,t.96. B.S.1:188&t(h). Me. to Ga. and La., w. to Iowa, Mo. Intr. 1746. Zone IV.—This is the only species with the young lvs. tomentose on both sides.

A. c. × *laevis* = **A. grandiflòra** Rehd. Tree or shrub: lvs. purplish when unfolding and floccose-tomentose, soon glabrous: racemes slightly villous; lower pedicels to 2.2. cm. long; petals obtuse; fls. rather large. Spontaneous with the parents. Cult. 1870.—Var. **rubéscens** Rehd. Fls. purple-pink in bud, tinged pink when open. Cult. 1920.—One of the handsomest shad-bushes, particularly the pink-fld. var.

A closely related species is **A. sèra** Ashe. Shrub to 4 m.: lvs. glabrous at maturity: racemes slender, glabrous or glabrescent; petals narrow, 2.5–3 mm. wide, acute; lower pedicels about 1.5 cm. long. Va. and Md. Intr. 1920. Zone V.—Very graceful species.

10. **A. laèvis** Wieg. Tree with spreading brs., to 12 m., sometimes shrubby: lvs. elliptic-ovate to ovate-oblong, short-acuminate, subcordate or rounded at base, rarely broad-cuneate, 3–7 cm. long, sharply serrate, nearly to the base, quite glabrous and purplish when young: racemes slender, many-fld., nodding, glabrous or nearly so; pedicels to 3 cm. long, in fr. to 5 cm.; petals linear-oblong, 1–1.8 cm. long; top of ovary glabrous: fr. purple or nearly black, bloomy, sweet. Fl.v; fr.vi. Em.2:503,t.(c, upper fig.) H.T.242. M.G.15:494, 495(h). G.34:343(h). G.M.44:306(h). (*A. canadensis* Gray, not Med.) Nfdl. to Ga. and Ala., w. to Mich. and Kans. Cult. 1880. Zone IV.—This is one of the most graceful and handsomest species in bloom, differing from all others in the purplish young foliage and in the drooping racemes.

11. **A. Bartramiàna** Roem. Shrub to 2.5 m.: lvs. elliptic to elliptic-oblong, acute or rounded at apex, cuneate, 3–5 cm. long, sharply serrate to below the middle or nearly to the base, glabrous when young: fls. 1–3, pedicels 1–2.5 cm. long, glabrous; petals obovate, about 8 mm. long; top of ovary woolly: fr. purplish black, bloomy. Fl.iv–v; fr.vii–viii. B.M.8499(c). G.F.1:247. B.C.1:273. (*A. oligocarpa* Roem.) Lab. to Mich. and Minn., s. to Pa. in the mts. Intr. about 1800. Zone I or II.

12. **A. prunifòlia** Greene. Much-branched shrub, to 4 m.; brts. pubescent: lvs. ovate to elliptic, rarely obovate, 1–2.5 cm. long, acute to obtuse, rather finely serrate, pubescent on both sides, finally glabrate above, finely appressed-

pubescent beneath; petiole 3–5 mm. long: racemes 3–6-fld., pubescent; pedicels 4–10 mm. long; ovary finely villous or sometimes nearly glabrous; sepals lanceolate, pubescent; petals oblong, 7–8 mm. long; stamens 10; styles usually 3, slightly pubescent at base; top of ovary villous or sometimes glabrous. S.H.1:f.413a-c,414a-f. (*A. rubescens* Greene.) Colo. to N. Mex. and Utah. Cult. 1900. Zone VI?

Closely related species are: **A. Purpùsii** Koehne. Lvs. truncate or emarginate at apex, rather coarsely serrate: ovary nearly glabrous; top of ovary glabrous. Colo. Intr. about 1900.—**A. plurinérvis** Koehne. Lvs. rounded at apex; petals narrow, to 11 mm. long; stamens 10–15; ovary sparingly pubescent, top glabrous. Rocky Mts. Intr. about 1900.

25. **PERAPHÝLLUM** Nutt. Deciduous shrub; buds small, acute, pubescent: lvs. partly fascicled, nearly sessile or short-stalked, entire or sparingly serrate, with minute caducous stipules; fls. white or tinged pink, in terminal 2–5-fld. umbel-like racemes; calyx-lobes lanceolate, entire; petals 5, obovate, spreading; stamens 20; styles 2–3, free, slightly longer than stamens: ovary wholly inferior, 2–3-celled, each cell with 2 ovules separated by a false partition: fr. a small pome 4–6-celled, each cell with one seed; calyx-lobed persistent. (Greek much and leaf, alluding to the crowded leaves.) One species.

P. ramosíssimum Nutt. Rigid upright shrub to 2 m.; young brts. tomentose: lvs. oblong to oblanceolate, narrowed at ends, 1.5–5 cm. long, silky-pubescent when young, later glabrous above; fls. 1.8 cm. across; disk rose-colored: fr. pendulous, globose, 8–10 mm. across, yellow with brownish or reddish cheek. Fl.v; fr.ix. B.M.7420(c). B.S.2:126. S.H.1:714. Ore. to Calif and Colo. Intr. 1870. Zone V.—Small shrub of little ornamental value and rarely doing well under cult.

26. **MÀLUS** Mill. Apple. Deciduous, rarely half-evergreen trees or shrubs, rarely with spinescent brs.; buds ovoid, with several imbricate scales: lvs. serrate or lobed, folded or convolute in bud, stipulate: fls. white to pink or carmine, in umbel-like racemes; petals usually suborbicular or obovate; stamens 15–50, with usually yellow anthers; ovary inferior, 3–5-celled; styles 2–5, connate at base: fr. a pome without or with some grit-cells, with persistent or deciduous calyx. (Ancient Latin name.) About 25 species in the temperate regions of N. Am., Eu. and Asia; in N. Am. s. to Fla. and Tex., in Asia to the Himal.—Some species are important fruit-trees, others belong to our most valuable ornamental trees and shrubs with showy fls. in spring and attractive fr. in autumn.

Lvs. convolute in bud, always undivided.....(Sect. I. EUMALUS Zabel.)
A. Calyx persistent.....(Gr. 1. Pumilae Rehd.)
B. Calyx-lobes longer than tube, acuminate.
c. Fr. depressed and usually ribbed at apex, with impressed calyx, short-stalked: lvs. crenate-serrate.....1. *M. pumila*
cc. Fr. usually ovoid, attenuate at apex and without ribs, the raised calyx with tubular fleshy base, usually slender-stalked: lvs. sharply serrate.....2. *M. prunifolia*
BB. Calyx-lobes shorter or as long as tube, acute: fr. slender-stalked: lvs. chartaceous, lustrous above.
c. Lvs. broad-cuneate or nearly rounded at base; petiole 1.5–2.5 cm. long: fr. usually contracted into the pedicel.....3. *M. spectabilis*
cc. Lvs. gradually attenuate at base; petiole 2–3.5 cm. long: fr. impressed at base. 4. *M. micromalus*
AA. Calyx deciduous (partly so in some hybrids).....(Gr. 2. Baccatae Rehd.)
B. Calyx-lobes longer than tube, narrow-lanceolate: fls. white; styles 5, rarely 4. 5. *M. baccata*
BB. Calyx-lobes shorter than tube or as long, triangular-ovate: fls. white or pink.
c. Styles 3, rarely 4; calyx-lobes acute or acuminulate: fr. ellipsoid.....6. *M. theifera*
cc. Styles 4 or 5, calyx-lobes obtusish: fr. pyriform, small.....7. *M. Halliana*

Lvs. folded in bud, sharply serrate and at least those of the shoots more or less lobed (except in no. 8).

A. Calyx deciduous.....(Sect. II. SORBOMALUS Zabel)
B. Styles villous at base.
C. Calyx and pedicels glabrous or slightly pubescent.....(Gr. 3. SIEBOLDIANAE Rehd.)
D. Lvs. never lobed, cuneate: fls. intense carmine in bud; styles usually 4, connate to the middle.....8. *M. floribunda*
DD. Lvs. at least those at end of shoots lobed, usually rounded at base: fl.-buds white or pink; styles connate at base.
E. Petals cuneate at base, often pink.
F. Lvs. of flowering brts. entire or nearly so, only upper lvs. of shoots slightly lobed; sepals longer than tube.....9. *M. zumi*
FF. Lvs. all serrate: lvs. of shoots lobed; sepals as long as tube..10. *M. Sieboldii*
EE. Petals suborbicular, rounded at base: low shrub with spreading brs. 11. *M. Sargenti*
DD. Calyx and pedicels tomentose: lvs. always lobed; styles 5. (Gr. 4. FLORENTINAE Rehd.) 12. *M. florentina*
BB. Styles glabrous.....Gr. 5. KANSUENSES Rehd.)
C. Fr. without grit-cells, not dotted: styles 3–4.
D. Lvs. undivided or partly 3-lobed.....13. *M. fusca*
DD. Lvs. deeply lobed, sometimes undivided.....14. *M. toringoides*
CC. Fr. with grit-cells, dotted; styles 3: lvs. 3–5-lobed.....15. *M. kansuensis*
AA. Calyx persistent; styles 5.
B. Fr. with a cup-shaped cavity at apex and apex of core not free: 1–1.5 cm. across, dotted, with grit-cells: lvs. not or slightly lobed: styles glabrous or nearly so. Gr. 6. YUNNANENSES Rehd.)
C. Lvs. glabrous or slightly pubescent beneath, not lobed.....16. *M. Prattii*
CC. Lvs. tomentose beneath, often slightly lobed.....17. *M. yunnanensis*
BB. Fr. with apex of core free and pointed; styles villous at base.
C. Fr. without grit-cells, usually depressed, with impressed calyx; pedicels slender fls. white to pink. (Sect. III. CHLOROMELES Rehd.)
D. Lvs. ovate to elliptic, not or only slightly lobed on vigorous shoots: fr. about 5 cm. across.....18. *M. platycarpa*
DD. Lvs. at least those of shoots lobed: fr. smaller.
E. Calyx glabrous or sometimes villous: lvs. usually glabrous and rather thin.
F. Lvs. acute or acuminate, serrate or doubly serrate.
G. Lvs. glaucescent beneath, even those of flowering brts. slightly lobed, ovate to triangular-ovate: calyx thinly villous.....19. *M. glaucescens*
GG. Lvs. green beneath; those of flowering brts. usually undivided, ovate to oblong-ovate.
H. Lvs. of flowering brts. ovate to oblong-ovate.....20. *M. coronaria*
HH. Lvs. of flowering brts. ovate-lanceolate to oblong-lanceolate. 21. *M. lancifolia*
FF. Lvs. of flowering brts. obtuse or acutish, crenate-serrate, cuneate at base, usually oblong.....22. *M. angustifolia*
EE. Calyx tomentose: lvs. tomentose beneath, those of shoots thickish and strongly veined.....23. *M. ioensis*
CC. Fr. with grit-cells, the calyx not impressed: fls. pure white; calyx tomentose.
D. Lvs. deeply lobed: fls. 6–8, slender-stalked: fr. 1.5 cm. across. (Sect. IV. ERIOLOBUS Schneid.) 24. *M. trilobata*
DD. Lvs. not or slightly lobed: fls. 2–5; styles villous below: fr. about 3 cm. across. (Sect. V. DOCYNIOPSIS Schneid.) 25. *M. Tschonoskii*

1. **M. pùmila** Mill. COMMON A. Tree to 15 m., with short trunk and round head; buds pubescent; young brts. tomentose: lvs. broad-elliptic to elliptic or ovate, 4.5–10 cm. long and 3–5.5 cm. broad, usually broad-cuneate, acute or acutish, crenate-serrate, pubescent on both sides at first, later glabrate above; petioles pubescent, rather stout, 1.5–3 cm. long: fls. white, suffused with pink; pedicels 1–2.5 cm. long, like the calyx tomentose; styles usually pubescent to the middle: fr. usually subglobose, 2 cm. across or larger, impressed at apex and at base. H.W.2:76,f.295(b),t.51(c). R.I.25:t.112(c). S.E.3:t.390(c). (*M. communis* DC., *M. Malus* Britt., *M. dasyphylla* Borkh., *Pyrus Malus* L., partly.) Eu., W. Asia. Cult. since ancient times.—Var. **apétala** Schneid. Fls. small, with deformed greenish petals, without stamens and with 10–15 styles: fr. open at the top. B.C.5:2870, 2871. (*M. dasyphylla dioeca* Zabel, *Pyrus apetala* Muenchh., *P. dioeca* Moench.) Cult. 1770.—Var. **péndula** Schneid. With pendulous brs. ("Elise Rathke").—Var. **paradisíaca**

Schneid. A dwarf form. (*M. p.* Med., *M. dasyphylla* Borkh.)—Var. **Niedzwetzkyàna** Schneid. Young lvs., fls., fr. including the flesh and bark and wood of the brs. red. B.M.7579(c). R.H.1906:232,t(c). F.R.2:344,t(c). S.L.266(h). (*M. N.* Dieck, *Pyrus N.* Hemsl.) S. W. Siber., Turkest. Intr. about 1891. —This species is the parent of most of our cult. Apples, though some probably are the offspring of hybrids with *M. sylvestris*, *M. prunifolia* and also *M. baccata.*

M. p. × *prunifolia* = **M. astracánica** Dum.-Cours. differing chiefly in the more sharply and coarsely serrate lvs. and in the longer-stalked usually bright red and bloomy fr. (*Pyrus Malus* var. *a.* Loud., *P. a.* DC.) Orig. before 1800. —*M. p.* × *spectabilis* = *M. magdeburgensis;* see under No. 3.—*M. p.* × *baccata* = *M. adstringens;* see under No. 5.—*M. p.* × *fusca* = *M. Dawsoniana;* see under No. 13.—*M. p.* × *ioensis* = *M. Soulardii;* see under No. 23.—*M. p. Niedzwetzkyana* × *atrosanguinea* = **M. purpúrea** Rehd. Young lvs. and brts. purple: lvs. smaller, lustrous, on shoots occasionally slightly lobed; pedicels longer; petals oblong; styles often 4: fr. smaller, with sometimes deciduous calyx. G.C.III.62:221. (*M. floribunda p.* Barbier.) Orig. before 1900.—Var. **Eleÿi** Rehd. Lvs. elliptic or ovate, reddish when unfolding, pubescent beneath, with purple midrib: fls. vinous-red, about 3 cm. across; petals ovate: fr. conic-ovoid, about 2.5 cm. long, deep purple-red, on slender stalks about 3 cm. long. G.C.III.68:85;72:214. Gn.86:240, 437; 88:81. (*M. E.* Hesse, *Pyrus E.* Bean.) Orig. before 1920.—Var. **aldenhaménsis** Rehd. Lvs. ovate to elliptic or ovate-oblong, pubescent beneath on veins or nearly glabrous and reticulate-veined, with purple midrib: fls. vinous-red, semidouble, 2.5–3 cm. across; calyx glabrous or slightly tomentose outside; sepals ovate to lance-ovate: fr. subglobose, deep purple-red, with persistent calyx. (*Pyrus Malus a.* Gibbs.) Cult. 1922.—For other hybrids of *M. p. Niedzwetzkyana* see *M. adstringens* uner No. 5 and *M. Soulardii* under No. 23.

A closely related species is **M. sylvéstris** Mill. differing chiefly in the nearly glabrous or slightly pubescent lvs., its glabrous pedicels and glabrous or slightly villous calyx; styles usually glabrous. R.I.25:t.111(c). S.E.3:t.389(c). (*M. acerba* Mérat, *Pyrus Malus* var. *s.* L.) Eu. Rarely cult.

2. **M. prunifòlia** Borkh. Small tree; young brts. pubescent: lvs. ovate or elliptic, 5–10 cm. long, acute or short-acuminate, rounded or cuneate at base, sharply serrate, pubescent on the veins beneath, finally glabrous; petioles slender, 1.5–5 cm. long: fls. white, about 3 cm. across; pedicels 2–3.5 cm. long, like the calyx glabrous or sometimes villous: fr. subglobose or ovoid, about 2 cm. across, yellow or red, with a cavity at base, calyx not impressed, the sepals connate at base into a short tube. B.M.6158(c). (*Pyrus p.* Willd.) N. E. Asia. Intr. about 1750.—Var. **rinki** Rehd. Lvs. pubescent beneath: fls. pinkish; calyx villous; pedicels usually shorter. B.M.8265(c). B.S.2:291. B.C.5:2873. (*M. Ringo* Carr., *M. yezoensis* Koidz., *M. Matsumurana* Koidz., *Pyrus p.* var. *r.* Bailey.) E. Asia. Intr. about 1850.—Cult. in E. Asia for its fr., particularly the var. As an ornamental tree chiefly valued for its bright red or yellow fr. produced in great abundance and persisting a long time on the tree.

M. p. × *pumila* = *M. astracanica;* see under No. 1.—*M. p.* × *baccata* = *M. robusta;* see under No. 5.—*M. p.* × *floribunda* = *M. Scheideckeri;* see under No. 8.—*M. p.* × *Sieboldii* = *M. sublobata;* see under No. 10.

3. **M. spectàbilis** Borkh. Tree to 8 m., of upright habit; young brts. sparingly pubescent, later red-brown: lvs. elliptic to elliptic-oblong, 5–8 cm. long, short-acuminate, cuneate, appressed-serrate, lustrous and glabrous above, pubescent beneath when young, finally nearly glabrous, subchartaceous; petioles 1–3 cm. long, pubescent: fls. deep rose-red in bud, fading to blush, 4–5 cm. across, semidouble or sometimes single; pedicels 2–3 cm. long, like the calyx glabrous or slightly villous; sepals triangular-ovate, shorter than tube: fr. subglobose, about 2 cm. across, yellowish, without cavity at base and stalk usually thickened at apex, sour. W.D.1:50(c). B.C.5:2873(fr). W.D.50(c, form with single fls.). B.M.267(c). L.B.1729(c). G.F.1:272.

Gn.59:209(h). M.G.14:455(h). (*Pyrus s.* Ait.) Intr. before 1780 from China; not known wild.—Var. **Rivérsii** Nash. With larger and broader lvs. and larger double pink fls. F.P.1872:25,t.(c). Gn.84:387. (*P. s. R.* Booth, *P. s. roseo-plena* Th. Moore.)—Var. **albi-plèna** Schelle. Fls. double, white.—One of the most handsome crab-apples in bloom, though fr. not showy.

M. s. × *pumila* = **M. magdeburgénsis** Schoch. Lvs. broader, pubescent beneath; pedicels shorter, like the calyx tomentose: fls. semidouble: fr. subglobose, larger. M.G.20:254(h). (*M. herrenkrugensis* Hort., ? *M. Kaido* Dipp.) Orig. before 1900.—*M. s.* × ? *baccata* = *M. micromalus;* see No. 4.

4. × **M. micromàlus** Mak. (*M. spectabilis* × ? *baccata*). Small tree of upright habit; young brts. pubescent, soon glabrous: lvs. elliptic-oblong, acuminate, cuneate, 5–10 cm. long and 2–4 cm. broad, serrulate, pubescent beneath when young, finally glabrous, lustrous above, of firm texture; petioles slender, 2–3 cm. long: fls. pink, about 4 cm. across; calyx-tube villous, its lobes glabrescent, ovate to oblong-ovate, as long as tube, acute; pedicels slightly pubescent, 2–3 cm. long: fr. subglobose, 1–1.5 cm. across, red, with cavity at base; calyx persistent or deciduous. R.H.1872:210,t.f.8(c). N.K. 6:t.13. Gn.88:77(h). (*Pyrus kaido* Mouillef., *M. Kaido* Pardé, not Dipp.) Japan. Cult. Intr. about 1856.—A handsome small tree of upright habit with showy pink fls.

5. **M. baccàta** Borkh. Tree to 14 m., with round head; young brts. glabrous, slender: lvs. elliptic or ovate to ovate-oblong, acuminate, cuneate or rounded at base, 3–8 cm. long, finely serrate, slightly pubescent beneath when young or glabrous; petioles 2–5 cm. long: fls. 3–3.5 cm. across, white; calyx glabrous, its lobes long-acuminate; pedicels slender, 1.5–4 cm. long; styles usually longer than stamens, slightly villous at base: fr. subglobose, 8–10 mm. across, red or yellow; calyx deciduous. Gt.11,t.364(c). B.S.2:278,t (h). M.G.14:454(h). (*Pyrus baccata* L., *M. b.* var. *sibirica* Schneid.) N. E. Asia to N. China. Intr. 1784. Zone I or II.—Var. **grácilis** Rehd. Small tree with pendent brs., smaller lvs. on longer stalks; fls. smaller. Intr. 1910.—Var. **mandshùrica** Schneid. Lvs. usually broad-elliptic, remotely serrulate, pubescent beneath when young; petioles pubescent: fls. fragrant; pedicels and calyx pubescent; styles scarcely as long as stamens: fr. larger to 1.2 cm. across, often broad-ellipsoid. B.M.6112(c). Gn.89:61(h, as *M. theifera*). (*M. cerasifera* Spach, *Pyrus cerasifera* Tausch, *Pyrus b.* var. *m.* Maxim.) C. Jap. to Amur Reg. and C. China. Intr. before 1825.—Var. **Jáckii** Rehd. Similar to var. *mandshurica*, but glabrous: fr. red, about 1 cm. across. Korea. Intr. 1905.—Var. **himalâica** Schneid. with broad-elliptic coarsely serrate lvs. pubescent beneath, from W. Himal. is probably not in cult.—Handsome tree pyramidal when young, later with round head, with showy white fls. in spring and attractive berry-like red or yellow fr. in autumn.

Hybrids of *M. baccata* with *M. prunifolia* and *M. pumila* are much cult. under the name "Siberian Crabs."—*M. b.* × *prunifolia* = **M. robústa** Rehd. Lvs. glabrescent or pubescent beneath: fls. slender-stalked, white or pinkish; calyx usually glabrous: fr. subglobose or ellipsoid, red or yellow, slender-stalked, up to 2 cm. across, usually partly with and partly without calyx. Beach, Apples N. Y. 2:264,t(c, as "Red Siberian"). (*M. cerasifera* Schneid., not Spach, *Pyrus cerasifera* Wenzig, not Tausch.) Intr. about 1815. Cult. in numerous forms. A peculiar form is var. **persicifòlia** Rehd. Lvs. oblong-lanceolate, peach-like. Intr. 1910 from N. China.—*M. b.* × *pumila* = **M. adstríngens** Zabel. Lvs. pubescent beneath: fls. usually pinkish with rather short villous stalk and villous calyx: fr. usually subglobose, up to 4 or 5 cm. across, rather short-stalked, red, yellow or green, calyx less often deciduous. Beach, Apples N. Y.2:260,t(c, "Martha"),266,t (c, "Transcendent"),256,t(c, "Hyslop"). Gs.4:181,t(c). A great variety of forms is in cult., many of them probably the product of *M. robusta* × *pumila*. A hand-

some form with large purple-red fls. is "Hopa Crab" (*M. b.* × *pumila Niedzwetzkyana*).—*M. b.* × *Halliana* × *M. Hartwigii;* see under No. 7.—*M. b.* × *floribunda* = *M. arnoldiana;* see under No. 8.—*M. b.* × *Sieboldii* = *M. zumi;* see No. 9.

A related species is **M. sikkimensis** Koehne. Brts. and lvs. beneath tomentose: lvs. ovate to ovate-oblong, 5–7 cm. long, long-acuminate, sharply serrate: fls. pink outside; calyx pubescent: fr. obovoid, 1.5 cm. long, red, dotted. B.M.7430(c). B.S.2:294. (*Pyrus s.* Hook. f.) Himal. Intr. 1849. Zone (V).

6. **M. theífera** Rehd. Tree to 8 m., with stiff, spreading brs.; young brts. pubescent, soon glabrous: lvs. ovate- to ovate-oblong, 5–10 cm. long, acuminate, sharply serrulate, pubescent on the veins beneath and finally glabrous, of firm texture; petioles 1–3 cm. long: fls. 3–7, white or pinkish, fragrant, 3.5–4 cm. across, on slender pedicels 3–4 cm. long, glabrous or slightly villous; sepals triangular-ovate, acute or acuminulate, purplish, glabrous; styles 3 or rarely 4: fr. globose, about 1 cm. across, usually greenish yellow with red cheek. C.C.174. Gn.89:221(h). (*Pyrus theifera* Bailey.) China, Himal. Intr. 1900. Zone V.—Var. **rôsea** Rehd. Fls. pink.—A handsome species very floriferous and resembling in bloom in its habit a Cherry-tree rather than an Apple-tree.

7. **M. Halliàna** Koehne. Tree to 5 m., with rather loose open head; young brts. soon glabrous, purple: lvs. ovate or elliptic to oblong-ovate, 3.5–8 cm. long, acuminate, crenate-serrulate, quite glabrous except the midrib above, dark green and lustrous above and often purple-tinted; petioles 5–20 mm. long: fls. 4–7, bright rose, 3–3.5 cm. across; pedicels slender, nodding, like the calyx purplish and glabrous; calyx-lobes ovate, obtusish; styles 4–5, the terminal fl. usually without pistil; petals usually more than 5: fr. obovoid, 6–8 mm. across, purplish, ripening very late. S.T.1:t.18. (*Pyrus H.* Voss.) Cult. in Japan and China. Intr. 1863. Zone V.—Var. **Parkmânii** Rehd. Fls. semidouble. Ad.4:t.134(c). G.F.1:152. M.G.14:457(h). Gn.89:313(h). (*Pyrus P.* Hort.)—Var. **spontânea** Rehd. Lvs. smaller, elliptic or elliptic-obovate: fls. smaller, nearly white; pedicels shorter; styles usually 4. (*M. s.* Mak.) Japan. Intr. 1919. Zone V.—A distinct graceful species with bright rosy fls. on drooping purple pedicels and with the young foliage purplish when unfolding.

M. H. × *Sieboldii* = **M. atrosanguínea** Schneid. Spreading shrub with nearly glabrous serrate lvs. and rose-purple fls. similar to those of *M. floribunda*, but not fading to white. (*Pyrus floribunda* var. *a.* Bean, *P. a.* Spaeth.) Orig. before 1905.—*M. a.* × *pumila Niedzwetzkyana* = *M. purpurea;* see under No. 1.—*M. H.* × *baccata* = **M. Hartwígii** Koehne. Intermediate between the parents: fls. pink, changing to white; pedicels and calyx red. Cult. 1906.

8. **M. floribúnda** Sieb. Shrub or tree to 10 m., with wide-spreading brs.; young brts. pubescent, becoming glabrous: lvs. elliptic-ovate or ovate to oblong-ovate, acuminate, usually cuneate, 4–8 cm. long, sharply serrate, on shoots larger and incisely serrate, pubescent beneath or finally nearly glabrous; petioles 1.5–2.5 cm. long: fls. deep carmine in bud, changing to pale pink or finally nearly white, 2.5–3 cm. across; pedicels pubescent, purple, 2.5–3.5 cm. long; calyx pubescent, purple, its lobes acuminate, petals obovate-oblong; styles usually 4: fr. globose, 6–8 mm. across, red. F.S.15:t.1585(c). R.H. 1866:311,t(c);1871:591,t(c). F.E.9:573(h). Gn.83:22(h);86:538(h). Gn.M. 30:22(h). (*Pyrus f.* Kirchn., not Lindl., *P. pulcherrima* Aschers. & Graebn.) Japan? Intr. 1862. Zone V.—One of the handsomest crab-apples with the fls. changing from carmine to white; extremely floriferous.

M. f. × *baccata* = **M. arnoldiàna** Sarg. Lvs. larger, ovate: fls. larger, of lighter color: fr. about 1 cm. across, yellow. M.G.24:27(h),28. Gn.M.30:22(h). (*M. floribunda* var. *a.* Rehd., *Pyrus f.* var. *a.* Bailey.) Orig. before 1883.—A very handsome and showy hybrid.—*M. f.* × *prunifolia* = **M. Scheidéckeri** Zabel. Small tree of upright habit; young brts. pubescent: lvs. ovate, 5–10 cm. long,

sharply and coarsely serrate, pubescent beneath, at least on midrib: fls. pale pink, usually semidouble, 3–3.5 cm. across; pedicels and calyx pubescent: fr. yellow, 1.5 cm. across, with usually persistent calyx. Gt.53:t.1529(c). Gn.17:526,t(c);86:538 (h). G.C.III.73:185. Gg.6:308(h). (*Pyrus S.* Spaeth, *P. pulcherrima* var. *S.* Bailey.) Orig. before 1888.

A related species or hybrid is **M. brévipes** Rehd. Of lower and denser habit: lvs. smaller, more closely serrate with shorter spreading teeth: fls. nearly white on glabrous pedicels about 1 cm. long; petals oval: fr. subglobose, about 1 cm. across, slightly ribbed, not pulpy at maturity, on stiff upright or spreading stalks. (*M. floribunda* var. *b.* Rehd.) Orig. unknown. Cult. 1883. Zone V.

9. × **M. zumi** Rehd. (*M. baccata mandshurica* × *Sieboldii*). Tree of pyramidal habit; young brts. slightly pubescent: lvs. ovate to ovate-oblong or oblong, acuminate, 4–9 cm. long, those of flowering brts. entire or crenate-serrulate, of shoots serrate or occasionally slightly lobed, pubescent beneath when young, becoming glabrous: fls. pink in bud, becoming white, 2.5–3 cm. across; calyx slightly villous outside, its lobes acuminate; petals elliptic; styles 4–5: fr. about 1.2 cm. across, red. S.T.1:t.91. (*Pyrus. z.* Mats.) Japan. Intr. 1892. Zone V.—Var. **calocárpa** Rehd. Habit spreading; only smaller lvs. of flowering brts. entire, those of shoots more deeply lobed: fls. somewhat smaller; styles 3–4. (*M. Sieboldii* var. *c.* Rehd.) Japan. Intr. 1905.—Handsome tree similar to *M. Sieboldii* var. *arborescens*, but of more upright habit and lvs. scarcely lobed.

10. **M. Siebóldii** Rehd. Shrub with spreading brs.; young brts. pubescent: lvs. ovate or elliptic, acuminate, 2.5–6 cm. long, sharply serrate, those of shoots broad-ovate, coarsely serrate and partly 3- or sometimes 5-lobed, pubescent on both sides, later glabrous or glabrescent above; petioles pubescent, 6–18 mm. long; fls. pink or deep rose in bud, finally nearly white, about 2 cm. across; pedicels 2–2.5 cm. long, like the calyx pubescent; petals obovate-oblong; styles 3–4: fr. globose, 6–8 cm. across, red or brownish yellow. R.H.1870: 451,t(c);1881:296. M.G.14:456(h). N.K.6:t.10. (*Pyrus Sieboldii* Regel, *M. Toringo* Sieb., *Pyrus Toringo* Sieb.) Japan (the cult. dwarf mountain form). Intr. 1856.—Var. **arboréscens** Rehd. Tree to 10 m.: lvs. larger, less deeply lobed and less pubescent; fls. often nearly white. W.A.38,t(h). Japan, Korea (the common wild form). Intr. 1892.—Graceful and handsome tree showy in bloom.

M. S. × *prunifolia* = **M. sublobàta** Rehd. Tree, usually pyramidal; young brts. tomentose; lvs. narrow-elliptic to elliptic-oblong, those of shoots broader, partly with 2 or only 1 short lobe, tomentose when young, pubescent beneath at maturity, 3.5–8 cm. long: fls. blush; pedicels and calyx villous; styles 4–5, rarely 3: fr. subglobose, 1.5–2 cm. across, yellow, usually, with calyx, sometimes without. Gs.4:181,t(c). Orig. or intr. from Japan about 1892.

11. **M. Sargénti** Rehd. Low shrub to 2 m., with horizontally spreading brs., often spinescent; young brts. tomentose: lvs. ovate, acuminate, rounded or subcordate at base, acuminate, 5–8 cm. long, sharply serrate, villous when young, finally nearly glabrous, those of shoots usually broad-ovate, mostly 3-lobed; petioles 2–3 cm. long, pubescent: fls. pure white, 2.5 cm. across; pedicels 2–3 cm. long, like the calyx glabrous; petals oval, broad at base, overlapping; styles usually 4 (3–5): fr. subglobose, about 1 mm. across, dark red, slightly bloomy. B.M.8757(c). S.T.1:t.36. G.C.III.57:291;58:308. Gn.M.30:22(h). M.G.18:389(h). (*Pyrus S.* Bean.) Japan. Intr. 1892. Zone V.—Low shrub of distinct habit, with abundant white fls. and attractive fr.; the lvs. turning orange and yellow in autumn.

12. **M. florentìna** Schneid. Small round-headed tree with upright brs.: young brts. villous: lvs. broad-ovate, usually truncate at base, 3–6 cm. long, all incisely lobed and serrate with several lobes on each side, tomentose

beneath; petioles 1–2.5 cm. long, pubescent: fls. 6–8, white, 1.5–2 cm. across; pedicels 2–3 cm. long, villous; calyx tomentose; stamens 30; styles 5: fr. broad-ellipsoid, 1–1.2 cm. long, red. B.M.7423(c). G.C.III:59:7. (*Pyrus f.* Targ., *P. crataegifolia* Savi, *Sorbus f.* K. Koch.) Italy. Cult. 1877.—Handsome small tree; the lvs. turning orange and scarlet.

13. **M. fúsca** Schneid. Shrub or small tree to 12 m.; young brts. pubescent: lvs. ovate to oblong-lanceolate, acute or acuminate, 3–10 cm. long, sharply serrate, often 3-lobed; pubescent on both sides, later glabrous above; petioles 2–3.5 cm. long, pubescent: fls. 6–12, white or pinkish, 2–2.5 cm. across; pedicels slender, like the calyx pubescent; styles 3–4: fr. ellipsoid, about 1.5 cm. long, red or yellow. B.M.8798(c). S.S.4:t.170. (*M. rivularis* Roem., *Pyrus f.* Raf., *P. rivularis* Dougl., *P. diversifolia* Bong.) Alaska to Calif. Intr. 1836. Zone V.—Var. **levipes** Schneid. Pedicels and calyx glabrous or nearly so.—Of little ornamental value.

M. f. × *pumila* = **M. Dawsoniàna** Rehd. Lvs. elliptic to elliptic-oblong, 4–9 cm. long, not lobed: fls. slender-stalked, with 3–5 glabrous styles: fr. elliptic-oblong, 2.5–3 cm. long, yellow, with small calyx. S.T.2:t.111. G.C.III.74:377. Orig. 1881. Zone V.

14. **M. toringoìdes** Hughes. Shrub or small tree to 8 m.; brts. slightly villous at first, soon glabrous: lvs. ovate to elliptic-oblong, 3–8 cm. long, with usually 2 pairs of crenate-serrate lobes, occasionally undivided and lanceolate-oblong to lanceolate, at maturity pubescent only on the veins beneath: fls. 2–2.5 cm. across, 3–6 in subsessile umbels; pedicels to 2 cm. long, slightly villous; calyx tomentulose, its lobes narrow-triangular; petals orbicular-obovate, hairy above; styles 4–5, rarely 3, glabrous: fr. globose-obovoid or obovoid-ellipsoid, 1–1.2 cm. long, yellow, usually with red cheek. B.M.8948(c). G.C.III.73:89. Kew Bull. 1920:207. W.A.102,t. (*M. transitoria* var. *t.* Rehd.) W. China. Intr. 1904. Zone V.—In fr. one of the handsomest of the crab-apples.

A closely related species is **M. transitòria** Schneid. Smaller and slenderer; young brts. tomentulose: lvs. 2–3 cm. long, more deeply lobed, with narrower lobes and more pubescent: fls. 1.5–2 cm. across; sepals shorter; petals broad-oblong: fr. 6–8 mm. long. Gn.86:585. Kew Bull.1920:207. (*Pyrus t.* Batal.) N. W. China. Intr. 1911. Zone V.—Less handsome than the preceding species.

15. **M. kansuénsis** Schneid. Small tree to 8 m.; young brts. pubescent: lvs. ovate, truncate, rounded or broad-cuneate at base, 5–8 cm. long, 3- or sometimes 5-lobed, with triangular-ovate acute closely serrate lobes, pubescent beneath, at least on the veins; petioles 1.5–4 cm. long: fls. 4–10, white, 1.5 cm. across; pedicels 1.5–2.5 cm. long, like the calyx villous, sepals narrowly triangular-ovate, acuminate, as long as tube; styles 3, glabrous: fr. ellipsoid, about 1 cm. long, yellow or red. S.H.1:f.403d-d′, 404d-e. (*Pyrus k.* Batal.) N. W. China. Intr. 1904. Zone V.—Var. **calva** Rehd. Lvs. beneath, calyx and pedicels glabrous, even when young.—Handsome small tree, but not particularly showy.

A related species is **M. honanénsis** Rehd. Lvs. broad-ovate, rarely oblong-ovate, with 2–5 pairs of broad-ovate serrulate lobes, pubescent beneath: infl. glabrous; styles 3–4: fr. subglobose, about 8 mm. across, dotted. N. E. China. Intr. 1921. Zone V.

16. **M. Práttii** Schneid. Tree to 10 m.; young brts. pubescent at first, soon glabrous: lvs. ovate or elliptic to ovate-oblong, acuminate, usually rounded at base, 6–15 cm. long, and 3.5–7.5 cm. broad, finely and doubly serrate, with callous-pointed teeth and with 8–10 pairs of veins sparingly pubescent beneath; petioles 1.5–3 cm. long: fls. white, 2 cm. across, in many-fld. clusters; pedicels 1.5–3 cm. long, pubescent or glabrous like the calyx;

petals suborbicular; styles 5, glabrous: fr. globose-ovoid or subglobose, 1–1.5 cm. across, red or yellow, punctate, on stout stalks; calyx persistent. (*Pyrus P.* Hemsl.) C. & W. China. Intr. 1909. Zone V.—Handsome tree with large lvs. but neither fls. nor fr. very conspicuous.

17. **M. yunnanensis** Schneid. Tree to 10 m.; young brts. tomentose: lvs. ovate to oblong-ovate, rounded or subcordate at base, short-acuminate, 6–12 cm. long, sharply and doubly serrate, partly with 3–5 pairs of broad short lobes and partly or mostly without, tomentose beneath: petioles 2–3.5 cm. long, tomentose: infl. many-fld., 4–5 cm. across, rather dense; fls. white, 1.5 cm. across; pedicels 1–2 cm. long, like the calyx tomentose or villous; sepals triangular-ovate, acuminate, about as long as tube; petals suborbicular; styles 5, nearly glabrous: fr. subglobose, 1–1.5 cm. across, red, punctate; calyx reflexed. G.M.56:897. S.H.1:403e-g,404b-c. G.C.III.78:227. (*Pyrus y.* Franch.) W. China. Intr. 1908. Zone V.—Var. **Veitchii** Rehd. Lvs. cordate, ovate, all distinctly lobulate with short acuminate lobes, finally glabrescent beneath: fr. bright red, white-dotted. B.M.8629(c). (*Pyrus V.* Hort., *P. yunnanensis* Bean, in part.) C. China. Intr. 1901.—Handsome tree, the lvs. turning orange and scarlet in autumn.

18. **M. platycárpa** Rehd. Tree to 6 m. with spreading unarmed brs.; young brts. thinly tomentose, becoming glabrous: lvs. ovate to elliptic, rounded at base and at apex, but with short acute point, sharply and usually doubly serrate, those of shoots usually broad-ovate with several pairs of short triangular lobes and pubescent on veins beneath: fls. 3–4 cm. across; pedicels and calyx glabrous: fr. depressed-globose, deeply impressed at ends, about 5 cm. across. S.T.2:t.189. S.M.384. (*Pyrus p.* Bailey.) N. C. to Ga. Intr. 1912.—Var. **Hoopèsii** Rehd. Lvs. slightly or not lobed: calyx and pedicels pubescent. Intr. 1876.—Sometimes planted as an ornamental tree; fr. used for preserves.

19. **M. glaucescens** Rehd. Shrub or small tree, with sometimes spiny brs. forming a broad twiggy head; brts. glabrous or glabrescent: lvs. broad-ovate or triangular-ovate, acute or short-acuminate, truncate or subcordate, 5–8 cm. long, with short triangular lobes; those of shoots more deeply lobed, thinly tomentose when young, quite glabrous at maturity, dark green above, glaucous beneath; petioles slender, soon glabrous: fls. about 3.5–4 cm. across; pedicels glabrous; calyx thinly villous or sometimes glabrous; styles slightly shorter than stamens: fr. depressed-globose, 3–4 cm. across, yellow and waxy, fragrant. S.T.2:t.157. B.C.5:2876, 2877. S.M.381. Ad.10:t.348(c). (*Pyrus g.* Bailey.) N. Y. to N. C. and Ala. Cult. 1902. Zone V.—Handsome round-headed tree; lvs. turning yellow and dark purple in autumn.

A related species is **M. glabràta** Rehd. with the lowest pair of veins springing directly from the cordate base, glabrous and purplish when young, green beneath calyx glabrous and purplish; style longer than stamens. S.T.2:t.188. S.M.380. (*Pyrus g.* Bailey.) N. C. to Ala. Intr. 1912.

20. **M. coronària** Mill. Tree to 10 m.; brts. tomentose at first: lvs. ovate to ovate-oblong, acute, usually rounded at base, 5–10 cm. long, irregularly serrate and usually slightly lobed, those of shoots with short broad lobes, floccose-tomentose when young, finally glabrous, green beneath, or those at end of shoots pubescent on the veins, rather thin: fr. depressed-globose, about 3 cm. across, ribbed at apex, greenish. B.M.2009(c). B.R.651(c). S.S.4:t.167. Gn.29:395;34:206. (*M. fragrans* Rehd., *Pyrus c.* L.) N. Y. to Ala., w. to Mo. Intr. 1724. Zone IV.—Var. **aucubaefòlia** Rehd. Lvs. variegated. (*Pyrus c.* var. *a.* Bailey.)—Var. **elongàta** Rehd. Lvs. narrowly triangular-ovate or oblong-ovate, more deeply lobed and incisely serrate, sometimes cuneate.

N. Y. to N. C. and Ala. Intr. 1912.—Var. **dasycâlyx** Rehd. Lvs. paler beneath, those of shoots sometimes pubescent on the veins: calyx villous. Ont. to Ohio and Ind. Intr. 1920.—Var. **Charlôttae** Rehd. A form of the preceding var. with semidouble large fls. Intr. about 1900.

An allied species is **M. bracteàta** Rehd. Lvs. less lobed, those of flowering brts. elliptic-ovate to oblong, abruptly acute or obtusish, sparingly serrate or sometimes entire, those of shoots slightly lobed, pubescent when young, soon glabrous, green or pale beneath. S.M.387. (*Pyrus b.* Bailey.) Mo. to Ga. and Ala. Intr. 1912. Zone V.

21. **M. lancifòlia** Rehd. Tree to 8 m., with spreading often spiny brs.; young brts. slightly pubescent or nearly glabrous: lvs. ovate-lanceolate to oblong-lanceolate, acute or acuminate, rounded or broad-cuneate, 4–8 cm. long, those of flowering brts. finely or sometimes coarsely serrate, those of shoots oblong-ovate, incisely serrate and slightly lobed, pubescent when young, glabrous at maturity and rather thin: fls. 3–3.5 cm. across; pedicels and calyx glabrous: fr. subglobose, about 2.5 cm. across, green and waxy. S.T.2:t.158. S.M.385. B.C.5:2876. (*Pyrus l.* Bailey.) Pa. to Va. and Mo. Intr. 1912. Zone V.

22. **M. angustifòlia** Michx. Shrub or tree to 10 m., with slender brs.; brts. glabrous or slightly pubescent at first: lvs. ovate-oblong, oblong or lance-oblong, obtuse or acutish, usually broad-cuneate, 3–7 cm. long, coarsely crenate-serrate or sometimes nearly entire, rarely more sharply serrate, glabrous and light green beneath, usually turning brown in drying, those of shoots broader, coarsely serrate and often lobed, usually slightly tomentose below, subcoriaceous at maturity and under favorable conditions half-evergreen: fls. 2.5 cm. across; pedicels and calyx glabrous or sometimes slightly villous; style villous only at base: fr. subglobose or sometimes higher than broad, 1.5–2.5 cm. across. B.R.1207(c). S.S.4:t.169. (*M. coronaria* Brit., not Mill., *M. sempervirens* Desf., *Pyrus a.* Ait.) Va. to Fla. and Miss. Intr. 1750. Zone (V).—Var. **péndula** Rehd. With slender pendulous brs.

M. a. × ? *pumila* = ? **M. heterophýlla** Spach. Orig. before 1830, but apparently not now in cult.

23. **M. ioénsis** Brit. Tree to 10 m.; brts. tomentose: lvs. ovate-oblong or elliptic-obovate, acute or short-acuminate, broad-cuneate or rounded, 5–10 cm. long, coarsely or incisely serrate or shallowly lobed, tomentose beneath, sometimes glabrescent at maturity except the veins, those of shoots more deeply lobed, at maturity of firm texture with strong veins; petioles stout, tomentose: fls. about 4 cm. across; pedicels stout, 2–3.5 cm. long, like the calyx tomentose: fr. subglobose or broad-ellipsoid, 2.5-3 cm. across sometimes angular, greenish, waxy. B.M.8488(c). S.S.4:t.168. (*Pyrus i.* Bailey, *M. coronaria* var. *i.*, Schneid.) Minn. and Wisc. to Neb., Kans. and Mo. Intr. 1885. —Var. **plèna** Rehd. "Bechtel's Crab." With double fls. G.C.III.25:397; 65:229. R.H.1910:60,t.(c). (*Pyrus angustifolia fl. pleno* Hort., *P. angustifolia Bechtelii* Hort.) Orig. before 1840, intr. 1888.—Var. **Pàlmeri** Rehd. Shrub or small tree to 6 m.: lvs. smaller, oblong, usually obtuse or obtusish, thinly pubescent, those of flowering shoots usually crenate-serrate. Mo. Intr. 1910. —Var. **texàna** Rehd. Similar to the preceding: lvs. smaller and much broader, not or only slightly lobed and densely villous. Texas. Intr.?—The double-flowered variety is often cult. as an ornamental tree and is very handsome in bloom.

M. i. × *pumila* = **M. Soulardii** Brit. Lvs. broad-ovate to elliptic-ovate, often obtuse at apex, irregularly crenate-serrate, occasionally slightly lobed, thickish and rugose, densely pubescent beneath: fls. on short and stout tomentose pedicels: fr. depressed-globose, often 5 cm. across or more, yellow and often with reddish cheek.

Iowa Acad. Sci.7:130,t. B.C.5:2871. (*Pyrus S.* Bailey.) Orig. before 1868. Occasionally wild from Minn. to Tex.—A form with red-purple fls. and red young lvs. is "Red Tip Crab" (*M. i.* × *pumila Niedzwetzkyana*).—Sometimes cult. for its fr.

24. **M. trilobàta** Schneid. Shrub or tree to 6 m.; young brts. pubescent: lvs. deeply 3-lobed and serrulate, 5–8 cm. long, the middle lobe with one or two smaller lobes on each side, the lateral lobes usually with a basal lobe, pubescent beneath when young, later nearly glabrous and light green, lustrous and bright green above; petioles slender, 3–7 cm. long: fls. 6–8, white, 3.5 cm. across; pedicels about 2 cm. long, villous; calyx tomentose; sepals lanceolate, longer than tube: fr. ellipsoid, red. G.C.III.72:341. S.H.1:f.402a-d,403a-c. (*Pyrus t.* DC., *Eriolobus t.* Roem.) W. Asia. Cult. 1877. Zone V.—Shrub of upright habit, with handsome lustrous lvs.; rare in cult.

25. **M. Tschonóskii** Schneid. Tree to 12 m.: brts. tomentose: lvs. elliptic-ovate to ovate-oblong, acuminate, rounded or subcordate at base, 7–12 cm. long, irregularly serrate or doubly serrate, sometimes slightly lobulate, tomentose when young, finally glabrous above, thinly tomentose beneath; petioles 2–3 cm. long: fls. white, 3 cm. across; pedicels 2–2.5 cm. long, tomentose like the calyx; sepals triangular-ovate, shorter than tube: fr. globose, 2–3 cm. across, yellowish green with purple cheek. B.M.8179(c). S.T.1:t.37. (*Pyrus T.* Maxim., *Eriolobus T.* Rehd.) Japan. Intr. 1892.—Handsome tree of pyramidal habit; the lvs. turning orange and scarlet.

The related **M. formosàna** Kawakami intr. from Formosa in 1918 is probably not hardy within our area.

27. **DOCÝNIA** Dcne. Evergreen or half-evergreen trees: lvs. entire or serrate, sometimes slightly lobed, stipulate: fls. short-stalked, 2–5 in umbels, before or with the lvs.; calyx densely tomentose, with lanceolate lobes; stamens 30–50; styles 5, connate at base, villous; ovary 5-celled, each cell with 3–10 ovules: fr. subglobose to ovoid or pyriform, 2–3 cm. across; calyx persistent. (Anagram of Cydonia.) Five species in China, Himal. and Annam.

D. docynioìdes Rehd. Half-evergreen or nearly deciduous tree: lvs. elliptic to oblong-lanceolate, acute or acuminate, rarely abruptly acuminate, broad-cuneate or nearly rounded at base, 5–8 cm. long, 2–4 cm. broad, serrate or serrulate toward the apex or entire, lustrous above, green and thinly pubescent or glabrescent at maturity beneath, chartaceous; petioles 5–20 mm. long: fls. about 2.5 cm. across, nearly sessile; stamens about 30: fr. subglobose or ellipsoid, 2–3 cm. across. S.L.190(h, as *D. Delavayi*). (*M. docynioides* Schneid.) S. W. China. Intr. 1903. Zone VII–VIII.

The closely related **D. Delavaÿi** Schneid. differs chiefly in its evergreen entire lvs. white-tomentose beneath. R.H.1918:133. (*Pyrus D.* Franch., *Eriolobus D.* Schneid., *Cydonia D.* Cardot.) S. W. China. Intr. between 1884 and 1890. Zone VIII?

28. **CHAENOMÈLES** Lindl. Deciduous or half-evergreen shrubs or small trees, with sometimes spiny brs.; buds small, with about 2 outer scales: lvs. short petioled, serrate or crenate, stipulate, of firm texture: fls. solitary or fascicled, before or after the lvs. sometimes partly staminate; calyx lobes 5, entire or serrulate; petals 5, large; stamens 20 or more; styles 5, connate at base; ovary 5-celled, each cell with many ovules: fr. a large, many-seeded pome; seeds brown. (Greek *chaincin*, to split and *meles*, apple; the fruit was supposed by Thunberg to split into 5 valves.) Including *Pseudocydonia* Schneid. Three species in E. Asia.

A. Fls. in leaf-less clusters, before or with the lvs.: calyx-lobes upright, entire; stipules large. (Sect. I. EUCHAENOMELES Schneid.)
B. Lvs. sharply serrate, acute: brts. smooth ..... 1. *C. lagenaria*
BB. Lvs. coarsely crenate-serrate, acutish or obtuse: brts. scabrous ..... 2. *C. japonica*
AA. Fls. solitary on leafy shoots; calyx-lobes serrulate, reflexed: stipules small. (Sect. II. PSEUDOCYDONIA Schneid.)
3. *C. sinensis*

1. C. lagenària Koidz. JAPAN QUINCE. Shrub to 2 m. with spreading spiny glabrous brs.: lvs. ovate to oblong, acute, 3–8 cm. long, sharply serrate, lustrous above, glabrous: fls. 3.5–5 cm. across, scarlet-red in the type, varying to pink and white; style usually glabrous: fr. globose to ovoid, 3–5 cm. high, yellow or yellowish green, fragrant. Fl.III–IV; fr.x. L.B.1594(c). G.O.t.70(c). G.C.III.34:434. R.H.1876:330,t.(fr). Gn.40:126,t.(c);71:262(h). (*Pyrus japonica* Sims, not Thunb., *Cydonia japonica* Pers., *Cydonia lagenaria* Lois.) China, cult. in Japan. Intr. from Japan before 1800. Zone V.—Many garden forms with fls. varying from dark scarlet to pink and white and some with double or semi-double fls. are in cult.—Var. **cathayénsis** Rehd. Shrub to 3 m.: lvs. elliptic-lanceolate to lanceolate, finely and sharply serrate, 3–11 cm. long and 1–3.5 cm. broad, pubescent on the midrib beneath when young: styles usually villous at base. H.I.2657–8. R.H.1924:64(fr). (*C. c.* Schneid., *Cydonia c.* Hemsl.) C. China. Intr. before 1900.—Var. **Wilsònii** Rehd. Shrub to 6 m.: lvs. fulvous-tomentose beneath: fls. salmon-pink: fr. ovoid, 10–15 cm. long. G.C.III.66:21, 22(h). J.L.41:f.122(h). (*Cydonia Mallardii* Hort.) W. China. Intr. 1910. Zone VI.—A popular shrub with bright early appearing fls., sometimes used for hedges; lvs. dark green and lustrous, long persisting.

2. **C. japónica** Lindl. Low shrub to 1 m.; brs. spiny, with short scabrous tomentum when young, verruculose the second year: lvs. broad-ovate to obovate, obtuse or acutish, 3–5 cm. long, coarsely crenate-serrate, glabrous: fls. brick-red, 2.5–3.5 cm. across: fr. subglobose, about 3 cm. across, yellow. Fl.III–IV; fr.x. B.M.6780(c). G.C.III.34:435. R.H.1875:195,t.(c). (*Pyrus j.* Thunb., *P. Maulei* Mast., *Cydonia Maulei* T. Moore, *C. Maulei* Schneid.) Japan. Cult. 1874. Zone V.—Var. **trìcolor** Rehd. Lvs. variegated with pink and white.—Var. **alpìna** Maxim. Dwarf shrub with procumbent stems and ascending brts.; lvs. orbicular-oval, 1–2.5 cm. long. R.H.1911:204,t(c). S.L.143(h). (*C. Maulei* var. *a.* Schneid., *Cydonia Sargenti* Lemoine.)

C. j. × *lagenaria* = **C. supérba** Rehd. It differs from *C. japonica* in the larger, but comparatively narrower, more sharply serrate lvs., and in the larger fls. of deep blood-red color; from *C. lagenaria* in the pubescent brts. when young, slightly verruculose the second year, in the smaller, generally obovate-oblong lvs., the smaller fascicled ones usually crenate-serrate and in the lower habit with more upright brs. (*Cydonia Maulei s.* Leichtl.)—Var. **alba** Rehd. has white fls., var. **rôsea** Rehd. (*Cydonia Maulei grandiflora rosea* Froebel) has light rose-colored fls. and var. **perfécta** Rehd. (*Cydonia M. grandiflora perfecta* Froebel) has scarlet fl. with usually 6–8 petals and larger and broader lvs.

3. **C. sinénsis** Koehne. Shrub or small tree; trunk with flaky bark; brts. spineless, villous when young: lvs. elliptic-ovate or elliptic-oblong, acute at ends, 5–8 cm. long, sharply and finely serrate, villous beneath while young; stipules lanceolate, glandular-ciliate: fls. 2.5–3 cm. across, light pink: fr. oblong, 10–15 cm. long, dark yellow, woody. Fl.v; fr.x. B.M.7988(c). B.R. 905(c). R.H.1889:228,t.(c). U. S. Inv. 55:t.5(h). (*Pyrus s.* Poir., *Cydonia s.* Thouin, *Pseudocydonia s.* Schneid.) China. Intr. about 1800. Zone (V), VI.—Shrub with handsome lvs. turning scarlet in autumn.

29. **CYDÒNIA** Mill. Deciduous unarmed shrub or small tree; buds small, pubescent, with few scales: lvs. petioled, entire, stipulate: fls. white

or light pink, terminal, solitary at the end of leafy shoots; sepals 5, entire, reflexed; petals 5, obovate; stamens 20; styles 5, free, pubescent below; ovary inferior, 5-celled, each cell with numerous ovules: fr. a many-seeded pome. (From Cydon, now Canea or Crete.) One species from Persia to Turkestan.

C. oblónga Mill. QUINCE. Shrub or tree to 8 m.; young brts. tomentose: lvs. ovate to oblong, acute, rounded or subcordate at base, 5–10 cm. long, dull green above, densely villous below; petioles 1–1.8 cm. long, tomentose; fls. 4–5 cm. across; pedicels and calyx tomentose; fr. pear-shaped, fragrant, yellow, villous. Fl.v; fr.x. G.H.t.81(c). N.D.4:t.36(c). F.D.25: t.2532(c). Gn.33:491. S.L.172(h). (*C. Cydonia* Pers., *C. vulgaris* Pers., *Pyrus C.* L.) C. Asia. Cult. since ancient times. Zone V.—Var. **marmoràta** Schneid. Lvs. yellow and white variegated.—Var. **pyrifórmis** Rehd. This is the typical form with pear-shaped fr.—Var. **malifórmis** Schneid. Fr. apple-shaped.—Var. **lusitànica** Schneid. Fr. pear-shaped and ribbed; lvs. large; a more vigorous form.—Var. **pyramidàlis** Schneid. Of pyramidal habit.—Grown chiefly for its fr. which is used for preserves, though it is not without ornamental merit in bloom and in fruit; the lvs. turn yellow late in autumn.

C. o. × *Pyrus communis* = *Pyronia Veitchii;* see below.

× **PYRÒNIA** Veitch. Hybrids between *Cydonia* and *Pyrus*, known in several forms intermediate between the parents and representing sexual hybrids and graft-hybrids. Syn. *Pirocydonia* Hans Winkl.

P. Danièli Rehd. (*Cydonia oblonga* + *Pyrus communis*, graft-hybrid.) Similar to Cydonia: lvs. ovate, 4–6 cm. long, rounded at base, irregularly serrate with setose teeth, less pubescent, involute in bud. Rev. Gén. Bot. 16:7,f.5,6. B.D.1925:63t,f.4. Orig. 1902.—Var. **Winkleri** Rehd. (*Pirocydonia Winkleri* Daniel.) Lvs. elliptic-ovate, 1–4.5 cm. long, acuminate, broad-cuneate, more pubescent, conduplicate in bud. R.H.1914:28,29. B.D.1925: 63,t,f.5. Orig. 1913.

P. Veìtchii Guillaumin. (*Cydonia oblonga* × *Pyrus communis.*) Lvs. elliptic, 5–6 cm. long, acute at ends, entire, pubescent when young; petiole 1.5–2 cm. long: fls. 3 at end of brts., short-stalked, 5 cm. across; sepals glandular-dentate; stamens 20; anthers violet; ovules 6 in each cell: fr. ellipsoid, 7–8 cm. long. Jour. Hered. 7:417, 418. (*P. V.* var. *John Seden* Guillaumin, *Cydonia Veitchii* var. *John Seden* Trabut.) Orig. before 1913. Var. **luxemburgiàna** Guillaumin. Lvs. about 9 cm. long, acute or obtuse, rounded at base: fls. 3.5 cm. across; ovules 4–6 in each cell: fr. pear-shaped. B.D.1925: 65,t. Orig. before 1913.

30. **PYRUS** L. PEAR. Deciduous, rarely half-evergreen trees or rarely shrubs, sometimes thorny; lvs. serrate or entire, rarely lobed, involute in bud, petiolate, stipulate; buds with imbricate scales: fls. with or before the lvs., in umbel-like racemes, white, rarely pinkish; sepals usually reflexed or spreading; petals clawed, suborbicular to broad-oblong; stamens 20–30; anthers usually red; styles 2–5, free, closely constricted at base by the disk; ovules 2 in each locule: fr. a usually pyriform pome; flesh with copious grit-cells; walls of locules cartilagineous; seeds black or nearly black. (Ancient Latin name of the pear tree; spelled *Pĭrus* in classical Latin.) About 20 species from Eu. to E. Asia, south to N. Afr., Persia and Himal.—Fruit and ornamental trees with conspicuous white fls. with or just before the lvs. which usually turn red or scarlet in autumn.

Fr. with persistent calyx.

A. Lvs. entire or crenate-serrulate, undivided.
B. Lvs. usually oblong and obtusish, papillose beneath, entire or slightly crenulate toward the apex, glabrescent.....1. *P. amygdaliformis*
BB. Lvs. not papillose beneath.
C. Lvs. entire, cuneate, usually pubescent beneath.
D. Lvs. linear-lanceolate to lanceolate, lustrous above.....2. *P. salicifolia*
DD. Lvs. broader.
E. Lvs. lanceolate to narrow-elliptic.....3. *P. elaeagrifolia*
EE. Lvs. elliptic to obovate.....4. *P. nivalis*
CC. Lvs. crenate-serrulate all around, orbicular-ovate to oblong-ovate.....5. *P. communis*
AA. Lvs. at least partly pinnatifid.....6. *P. heterophylla*
AAA. Lvs. setosely serrate, generally ovate, glabrous.....7. *P.ussuriensis*

Fr. with deciduous or partly deciduous calyx, brown (yellow in No. 8).

A. Lvs. dentate or sharply serrate.
B. Lvs. sharply serrate or serrulate, often with appressed teeth; 6–12 cm. long.
C. Fr. yellow: lvs. broad-cuneate at base; styles 5, rarely 4.....8. *P. Bretschneideri*
CC. Fr. brown: lvs. usually rounded or subcordate.
D. Styles 5: lvs. setosely serrate or with appressed acuminate teeth...9. *P. serotina*
DD. Styles 3–4; calyx occasionally partly persistent: lvs. serrulate with acute teeth. 10. *P. serrulata*
BB. Lvs. dentate-serrate with more or less spreading teeth: styles 2–4:
C. Lvs. glabrous, 6–10 cm. long: styles 3–4, rarely 2: fr. subglobose or pyriform, 1.5–2.5 cm. long.....11. *P. phaeocarpa*
CC. Lvs. pubescent, 4–7.5 cm. long: styles 2 or 3: fr. subglobose, about 1 cm. diam. 12. *P. betulifolia*
AA. Lvs. crenate or crenulate-serrulate.
B. Lvs. crenate-serrulate, orbicular-ovate to ovate, about 5 cm. long; styles 5. 13. *P. longipes*
BB. Lvs. crenate.
C. Styles 3–5; stamens 25–30: lvs. ovate to oblong.....14. *P. pashia*
CC. Styles 2–3; stamens 20: lvs. orbicular-ovate to oblong-ovate.....15. *P. Calleryana*

1. **P. amygdalifórmis** Vill. Shrub or small tree to 6 m., with spreading sometimes thorny brs.; young brts. slightly villous, soon glabrous, lustrous, brown: lvs. oval to obovate or oblong, acutish or obtuse, cuneate or sometimes rounded at base, 2.5–7 cm. long, slightly crenate or entire, slightly tomentose when young, soon glabrous and lustrous above, glabrescent and glaucescent beneath; thickish; petioles slender, 1–3 cm. long: infl. 8–12-fld., grayish tomentose, rarely calyx glabrous outside; fls. 2–2.5 cm. across: fr. subglobose, 2–3 cm. across, yellowish brown, on a stout stalk about as long as fr. B.R.1484 (c, as *P. nivalis*). H.W.3:77. B.S.2:273. Dene., Jard. Fruit. 1:t.13. (*P. parviflora* Desf., *P. Boveana* Dene.) S. Eu., W. Asia. Intr. 1810. Zone V.—Var. **lobàta** Koehne. Lvs. small, usually with few round lobes. S.H.1:f.361h(l). (*P. collivaga* Vel., *P. a.* var. *heterophylla* Dipp.)—Var. **cuneifòlia** Bean. Lvs. smaller and narrower, attenuate at base. Gussone, Pl. Rar. t.39. (*P. c.* Guss., ?*P. pyrainus* Raf.)—Var. **oblongifòlia** Bean. Lvs. oval to oblong, obtuse, rounded at base: fr. larger. Dene., Jard. Fruit. 1:t.14. S.H.1:f.361g. (*P. o.* Spach.)—Var. **pérsica** Bornm. Lvs. oblong, 3–7 cm. long, slightly crenulate: fr. slightly depressed-globose, 3 cm. diam., on a stalk 2 cm. long. Dene., Jard. Fruit. 1:t.15. S.L.321(h). (*P. persica* Pers., *P. sinaica* Dum.-Cours.) W. Asia. Intr. before 1810.

P. a. × *nivalis* = **P. Michaùxii** Bosc. Lvs. ovate or elliptic-oblong, obtuse or abruptly pointed, 3–7 cm. long, entire, villous-tomentose when young, later glabrous and lustrous above, pubescent or glabrous beneath: infl. dense, tomentose: fr. globose or turbinate, greenish yellow. Decne., Jard. Fruit,1:t.16. Cult. before 1816.

2. **P. salicifòlia** Pall. Tree to 8 m., with slender more or less pendulous brs.; brts. densely villous the first year: lvs. narrow-lanceolate, attenuate at ends, 3–9 cm. long, 7–20 mm. wide, entire, white-tomentose when young, later glabrous and lustrous above; petioles 3–15 mm. long: infl. tomentose, dense, many-fld.; fls. 2 cm. across; pedicels about 1 cm. long: fr. pear-shaped, 2–3 cm. long, short-stalked. L.B.1120(c). B.R.514(c). G.O.125(c). Decne.,

Jard. Fruit. 1:t.12. G.C.II.14:145. S. E. Eu., W. Asia. Intr. 1780. Zone IV. —Var. **péndula** Jaeg. With slenderer and more pendulous brs.

P. s. × *nivalis* = *P. canescens;* see No. 4.

Another species with narrow entire lvs. is **P. glábra** Boiss. Young brts. villous at first: lvs. narrow-lanceolate, 4–10 cm. long, sometimes obscurely crenulate, glabrous from the very first; petiole 8–35 mm. long; styles 3–4: fr. subglobose, small. Decne., Jard. Fruit,1:t.11. S.H.1:f.360a-a², 361a. Persia. Cult. ?

3. **P. elaeagrifòlia** Pall. Small tree, usually thorny; young brts. tomentose: lvs. lanceolate to obovate-lanceolate or narrow-elliptic, obtusish or short-acuminate, cuneate, 4–7 cm. long, 1.2–2.5 cm. broad, entire, grayish or whitish tomentose on both sides, often glabrescent above; petioles 1–4 cm. long: infl. white-tomentose; fls. 2.5–3 cm. across; pedicels 1–2 cm. long: fr. globose-turbinate or subglobose, 2–2.5 cm. across, green, short-stalked. Decne., Jard. Fruit. 1:t.17. (*P. nivalis* var. *e.* Schneid.) Asia Minor. Intr. 1800. Zone IV.—Var. **Kotschyàna** Boiss. Usually thornless: lvs. broader, 6–9 cm. long. Decne., Jard. Fruit. 1:t.18. (*P. K.* Boiss.) Asia Minor.

P. e. × *betulifolia* = *P. congesta;* see under No. 12.

4. **P. nivàlis** Jacq. Snow P. Thornless tree, to 16 m.: young brts. tomentose: lvs. elliptic to obovate, acute, cuneate, 5–8 cm. long, 2–4 cm. broad, entire, white-tomentose when young, finally glabrous above; petioles 1–3 cm. long: infl. white-tomentose: fls. 2–3 cm. across: fr. subglobose, to 5 cm. across, yellowish green; stalk as long or longer than fr. G.H.t.77(c). H.C. t.79(c). Decne., Jard. Fruit. 1:t.21. E. Eu. Cult. 1800. Zone V.—Var. **austríaca** Schneid. Lvs. elliptic, glabrescent. (*P. a.* Kern.)

P. n. × *salicifolia* = **P. canéscens** Spach. Lvs. lanceolate to narrow-elliptic, crenate-serrulate toward the apex, lustrous above at maturity: fr. pale green, short-stalked. Decne., Jard. Fruit.1:t.19. Orig. before 1830.—*P. n.* × *communis* = **P. salvifòlia** DC. Lvs. elliptic to ovate, acute to acuminate, broad-cuneate or nearly rounded at base, usually crenulate, pubescent when young, finally glabrescent, long-petioled: infl. glabrescent: fr. pyriform, long-stalked. G.O.127(c). B.R.1482. S.H.1:f.361(l). Cult. before 1800.—*P. n.* × *amygdaliformis* = *P. Michauxii;* see under No. 1.

5. **P. commùnis** L. Common P. Broad-pyramidal tree to 15, rarely to 20 m.; sometimes spiny: young brts. glabrous or slightly pubescent: lvs. orbicular-ovate to elliptic, acute or short-acuminate, subcordate to broad-cuneate, 2–8 cm. long, crenate-serrulate, glabrous or villous when young; petioles slender, 1.5–5 cm. long: infl. villous or nearly glabrous; pedicels 1.5–3 cm. long; fls. about 3 cm. across: fr. turbinate or subglobose, on slender stalk to 5 cm. long. S.E.3:t.488. H.W.3:76(h);t.50(c). M.A.t.42(h). G.W. 16:368(h). Eu., W. Asia. Long cult. and often escaped and naturalized. Zone V.—Var. **pyráster** L. Usually thorny: fls. 2–2.5 cm. across: fr. 1.5–2 cm. across. (*P. p.* Borkh., *P. c.* var. *achras* Wallr.)—Var. **cordàta** Hook. Lvs. suborbicular to ovate, subcordate, 2–3 cm. across: fls. smaller: fr. about 1.5 cm. across. Decne., Jard. Fruit.1:t.3. (*P. c.* Desv., *P. com.* var. *Briggsii* Syme.)—Var. **satîva** DC. Thornless tree: lvs. larger: fls. 2.5–3.5 cm. across: fr. large and juicy. Used as a collective name for the cult. varieties which, however, may be partly hybrids.—Var. *sabauda* Decne. is possibly a hybrid with *P. amygdaliformis.*

P. c. × *nivalis* = *P. salvifolia;* see under No. 4.—*P. c.* × *serotina* = *P. Lecontei;* see under No. 9.—*P. c.* × *Crataegus Oxyacantha* = *Pyrocrataegus Willei;* see p. 376.—*P. c.* × *Sorbus Aria* = *Sorbopyrus auricularis;* see p. 384.—*P. c.* × *Cydonia oblonga* = *Pyronia Veitchii;* see p. 402.

Related species are: **P. Balánsae** Decne. Lvs. ovate to oblong-ovate, long-acuminate, rounded at base, 5–10 cm. long, entire or crenate, sharply serrulate on young plants: fr. turbinate, about 2.5 cm. across, long-stalked. Decne., Jard. Fruit. 1:t.6. S.H.1:f.361p(l). W. Asia. Intr. 1866.—**P. syríaca** Boiss. Small tree, often thorny: lvs. oblong to oblong-lanceolate, 2–5, rarely to 10 cm. long, crenate-serru-

late, glabrous or nearly so; petioles 2–5 cm. long: infl. tomentose: fr. pyriform, 3–3.5 cm. across. Decne., Jard. Fruit.1:t.9. S.H.1:f.361o,362e-f. M.D.1924:t.22(h). W. Asia, Cyprus. Intr. before 1874. Zone ?V.—**P. Korshínskyi** Litv. Tree; young brts. tomentose: lvs. oblong-lanceolate to ovate-oblong, acuminate, 5–8 cm. long, crenate-serrulate, villous-tomentose when young; petioles 1.5–3 cm. long: infl. villous; pedicels 2–3 cm. long; disk pubescent; style villous at base: fr. subglobose, 2 cm. across, on a stout stalk. S.H.1:f.359a-b. (*P. bucharica* Litv.) Turkest. Intr. 1890. Zone V.

6. **P. heterophýlla** Reg. & Schmalh. Shrub or tree to 10 m.; brts. glabrous or slightly pubescent at first, purple-brown the second year: lvs. very variable, ovate to ovate-oblong, rounded at base, partly undivided and crenate-serrulate, partly pinnatifid or lobed, 2–6 cm. long, with 5–7, usually narrow serrulate lobes, tomentose when young, soon glabrous; petioles 2–6 cm. long: infl. villous, few-fld.; fls. 2–2.5 cm. across; pedicels 1–1.5 cm. long: fr. pyriform or depressed-subglobose, 2–3 cm. across. B.S.2:284. G.C.III. 7:115. S.H.1:f.359e-f,361b. Turkest. Intr. 1891. Zone V.

7. **P. ussuriénsis** Maxim. Tree; brts. glabrous or nearly so, yellow-gray to purple brown the 2d year, older brs. usually yellow-gray or yellowish brown: lvs. orbicular-ovate to ovate, acuminate, rounded or subcordate at base, 5–10 cm. long, setosely serrate, glabrous or nearly so; petiole 2–5 cm. long: infl. dense, hemispherical, glabrous, pedicels 1–2 cm. long; fls. 3–3.5 cm. across; petals obovate, gradually narrowed toward the base; styles pilose near base: fr. subglobose, short-stalked, greenish yellow, 3–4 cm. across. R.H.1872:28. B.C.5:2868. N.K.6:t.19. Gt.10:t.345. U.S.Im.131:213, 214(h). Gn.M.31:263(h). (*P. Simonii* Carr., *P. sinensis* Decne., not Lindl., nor Poir.) N. E. Asia. Intr. 1855. Zone IV.—Var. **ovoìdea** Rehd. With spreading brs.: brts. brown; lvs. ovate to oblong-ovate; fr. ovoid to subglobose or ellipsoid; pedicels longer. N.K.6:t.17. B.C.5:2868. M.G.31:102. (*P. o.* Rehd., *P. Simonii* Hort., not Carr.) N. China, Korea. Intr. about 1865. Zone V.—Var. **hondoénsis** Rehd. Lvs. ovate to ovate-oblong, with finer more appressed and less aristate serration, at first like the young brts. often with ferrugineous floccose tomentum: pedicels longer. (*P. h.* Kikuchi & Nak.) C. Japan. Intr. 1917.

A related species is **P. Lindleỳi** Rehd. Lvs. serrate or denticulate, ovate, abruptly acuminate: fr. broad-ellipsoid, long-stalked, with persistent calyx. B.R. 1248(c). M.G.31:111(l). (*P. sinensis* Lindl., not Poir.) China. Intr. 1820.

8. **P. Bretschneìderi** Rehd. Tree; brts. glabrous or nearly so, purple-brown the 2d year: lvs. ovate or elliptic-ovate, acuminate, broad-cuneate, rarely rounded, 5–11 cm. long, sharply serrate with acuminate setose teeth usually slightly appressed, floccose at first, soon glabrous; petioles 2.5–7 cm. long: infl. sparingly floccose at first, soon glabrous; pedicels 1.5–3 cm. long; fls. 2.5–3 cm. across: fr. globose-ovoid or subglobose, 2.5–3 cm. long, yellow; flesh soft and juicy; pedicels 3–4 cm. long; flesh juicy and soft. Hedrick, Pears N. Y. 74,t(c). M.G.31:103. N. China. Intr. 1882. Zone V.

9. **P. seròtina** Rehd. Sand P. Tree; brts. glabrous or floccose while young, purplish brown or dark brown the 2d year: lvs. ovate-oblong, rarely ovate, long-acuminate, rounded or rarely subcordate at base, 7–12 cm. long, sharply setose-serrate with usually slightly appressed teeth, glabrous or slightly floccose while young; petioles 3–4.5 cm. long: infl. glabrous or floccose at first; fls. 3–3.5 cm. across, pedicels 3.5–5 cm. long; sepals long-acuminate, almost twice as long as tube; petals ovate; styles 5, rarely 4, glabrous: fr. subglobose, about 3 cm. across, brown with pale dots; flesh rather hard. N.K.6:t.23. B.C.5:2868. M.G.31:104. (*P. sinensis* Auth., not Lindl. nor Poir., *P. montana* Nak.) C. and W. China. Intr. 1909. Zone V.—Var.

Stapfiàna Rehd. With pyriform fr. B.M.8226(c). China. Cult. 1875.—Var. **cúlta** Rehd. Lvs. larger and broader, to 15 cm. long: fr. larger, apple- or pear-shaped. R.H.1879:170,t(c);1880:110,t(c). (*P. montana* var. *Rehderi* Nak.) Cult. in China and Japan. Intr. before 1850 to Am. Here belong most of the forms known as Chinese or Japanese pears.

P. s. × *communis* = **P. Lecontei** Rehd. With serrulate or crenate-serrulate lvs. and yellow fr. with persistent calyx. Here belong Kieffer, LeConte etc. B.C.5: f.2809, 2810. Hedrick, Pears N. Y.180, 187,tt(c). Orig. before 1850.

10. **P. serrulàta** Rehd. Tree; brts. woolly when young, soon glabrous, purple-brown the 2d year: lvs. ovate to ovate-oblong, abruptly or gradually acuminate, broad-cuneate or rounded at base, 5–11 cm. long, serrulate with acute not setose teeth, floccose beneath at first, soon glabrous; petioles 3.5–7 cm. long: infl. slightly woolly; fls. 2.5 cm. across; pedicels 1.5–2 cm. long; sepals acute or acuminate, about as long as tube; styles 3–4, rarely 5: fr. subglobose, 1.5–1.8 cm. long, brown, with pale dots; calyx sometimes partly or wholly persistent. M.G.31:112. C. China. Intr. 1917. Zone V.

11. **P. phaeocárpa** Rehd. Tree; young brts. tomentose, glabrous and purple-brown the 2d year: lvs. elliptic-ovate to oblong-ovate, long-acuminate, usually broad-cuneate, 6–10 cm. long, dentate-serrate, with spreading teeth, loosely villous at first, soon quite glabrous; petioles 2–6 cm. long: infl. woolly, rarely nearly glabrous; pedicels 2–2.5 cm. long; fls. about 3 cm. broad; styles 3–4, rarely 2; fr. pyriform, 2–2.5 cm. long, brown with pale dots, soon becoming soft. B.C.5:f.3282. M.G.31:112. Monatschr. Ver. Gart. Preuss. 22:t.4 (fr. only). N. China. Intr. 1870. Zone V or IV.—Var. **globòsa** Rehd. Lvs. often ovate and rounded at base: fr. subglobose, 1.5–2 cm. across. Intr. 1882.

12. **P. betulaefòlia** Bge. Tree to 10 m.; young brts. tomentose until the 2d year: lvs. rhombic- to oblong-ovate, acuminate, broad-cuneate, 5–8 cm. long, sharply and rather coarsely serrate, finally bright green and lustrous above, tomentose beneath or finally glabrescent; petioles tomentose, 2–3 cm. long: infl. tomentose, 8–10-fld. fls. 1.5–2 cm. across; pedicels 2–2.5 cm. long; styles 2–3: fr. subglobose, 1–1.5 cm. across, brown, dotted. G.F.7:225. Hedrick, Pears N.Y.80,t(c). R.H.1879:318, 319. Gng.6:309(h). N. China. Intr. about 1865. Zone IV.—Graceful tree with spreading and slightly pendulous brs.

P. b. × ? *elaeagrifolia* = **P. congésta** Rehd. Lvs. ovate to elliptic-lanceolate, sharply serrulate, 3–6 cm. long, tomentose beneath: infl. dense, 6–9-fld.; styles 3–4, rarely 5: fr. 1–1.5 cm. across with persistent calyx. Orig. about 1890.

13. **P. lóngipes** Coss. & Dur. Small tree with few thorns: lvs. ovate to orbicular-ovate, short-acuminate or obtusish, rounded at base, about 5 cm. long, crenate-serrulate, floccose beneath at first, soon glabrous; petioles slender, 1–3.5 cm. long: infl. floccose-tomentose, soon glabrous; fls. about 3 cm. across; pedicels slender: fr. globose, about 1.5 cm. across, brown, dotted, on slender stalks about 3 cm. long. Decne., Jard. Fruit. 1:t.4. S.H.1:f.365f. (*P. communis* var. *l.* Henry.) Algeria. Intr. before 1875.

A closely related species is **P. Boissieriàna** Boiss. & Buhse. Lvs. ovate, rounded or subcordate, 2–3.5 cm. long; petioles usually longer than limb. S.H.1:f.363g,364b. Persia. Intr. ?—Both species are probably closely related to *P. communis*, but differ in the deciduous calyx of the small fr.

14. **P. páshia** Buch.-Ham. Tree to 12 m., mostly spiny; young brts. woolly, later glabrous: lvs. ovate to oblong-ovate or oblong, acuminate, usually rounded at base, 6–12 cm. long, crenate or crenate-serrulate, on young plants or suckers often lobed and sharply serrate, tomentose while young, finally glabrous or nearly so; petioles 1.5–4 cm. long: infl. tomentose; fls. 2–2.5 cm. across; pedicels short; calyx-lobes triangular, acute; stamens 25–30;

styles 3–5: fr. subglobose, about 2 cm. across, brown; pedicels 2–3 cm. long. Decne., Jard. Fruit. 1:t.7. Collett, Fl. Siml. f.47. S.H.1:f.363h,364e-g. M.G. 31:113. (*P. variolosa* Wall.) Himal., W. China. Intr. 1908. Zone V.—Var. **kumaòni** Stapf. Lvs. and infl. glabrous or nearly so; calyx-lobes ovate, often obtuse. B.M.8256(c). B.S.2:290. S.L.322(h). Himal. Intr. 1825. Zone V or VI.

15. **P. Calleryàna** Decne. Tree: brts. glabrous; winter-buds finely pubescent: lvs. broad-ovate to ovate, rarely elliptic-ovate, short-acuminate, rounded or broad-cuneate at base, 4–8 cm. long, crenate, usually quite glabrous; petioles 2–4 cm. long: infl. glabrous; fls. 2–2.5 cm. across; pedicels 1.5–3 cm. long; stamens 20; styles 2, rarely 3: fr. globular, about 1 cm. across, slender-stalked, brown, dotted. N.K.6:t.25. M.I.4:t.242. S.H.1:363p,364q-s. M.G. 31:113. U.S.Im.160:t.243(h). China. Intr. 1908. Zone V. Handsome free-flowering tree with glossy foliage.—Var. **graciliflòra** Rehd. Brts. tomentose toward the apex: fls. smaller; pedicels slenderer; anthers pink.—Var. **tomentélla** Rehd. Brts. densely tomentose, glabrous the 2d year: lvs. floccose at first, later glabrous except the midrib; those of shoots often serrulate: infl. villous.—Both forms intr. with the type.

Subfam. III. Rosoideae Focke. Herbaceous or woody plants, usually shrubby, rarely trees: lvs. often compound, stipulate, sometimes evergreen: infl. variable: carpels distinct usually numerous, forming a head on a torus, rarely solitary; style often lateral: fr. never splitting.

31. **NEVIÙSA** Gray. Deciduous shrub: lvs. alternate, petioled, doubly serrate, stipulate: fls. perfect, apetalous, solitary or in cymes; calyx-tube flattish; sepals 5, petaloid, serrate, persistent, spreading; stamens numerous, longer than sepals; carpels 2–4, with slender styles shorter than stamens, becoming drupe-like achenes. (After its discoverer, R. D. Nevius.) One species in Alabama.

N. alabaménsis Gray. Upright shrub, 1–2 m. high: brts. terete: lvs. ovate to ovate-oblong, acute or acuminate, 3–7 cm. long, doubly serrate, those of shoots slightly lobed, nearly glabrous: fls. 3–8, rarely solitary, about 2.5 cm. across; pedicels 1.5–2 cm. long. B.M.6806(c). G.C.III.35:229;41:41. S.L.275(h). G.M.53:315. Fl.vi–vii. Intr. about 1860. Zone V.—Cult. chiefly for its white feathery fls.

32. **KÉRRIA** DC. Deciduous shrub; buds small, with several scales: lvs. alternate, doubly serrate, stipulate: fls. yellow, solitary, perfect; sepals short, entire, calyx-tube flattish; petals 5; stamens numerous, half as long as petals; carpels 5–8, becoming dry achenes. (After William Kerr of Kew; d. 1814.) One species in China.

K. japónica DC. Shrub to 1.5 or 2 m.; brts. green, striped, glabrous: lvs. oblong-ovate, acuminate, 2–5 cm. long, doubly serrate, bright green and glabrous above, paler and slightly pubescent below; petioles 5–15 mm. long: fls. terminal on lateral brts., 3–4.5 cm. across; petals oval; stamens about half as long as petals; styles about as long as stamens: achenes brownish black. S.Z.1:t.98(c). B.R.1873(c). R.H.1869:293. F.E.9:593. A.G.18:425. (*Corchorus japonicus* Thunb.) Much cult. in E. Asia. Intr. 1834. Zone V.—Planted for its bright green foliage and showy yellow fls. in spring; conspicuous in winter by its green brs.—Var. **aureo-vittàta** Hartw. & Ruempl. Brts. striped green and yellow. (Var. *vittato-ramosa* Zab., var. *ramulis variegatis aureis* Hort.) Intr. before 1864.—Var. **pícta** Sieb. Lvs. edged white. I.H.9:336(c). F.M.5:296(c). (Var. *variegata* T. Moore, var. *argenteo-variegata*

Wyman.) Intr. 1844.—Var. **aureo-variegàta** Rehd. Lvs. edged yellow. (Var. *aurea variegata* Bean.)—Var. **pleniflòra** Witte. Fls. double. B.M.1296(c). G.M.5:210. G.Z.9:48. Intr. 1805.

33. **RHODÓTYPUS** Sieb. & Zucc. Deciduous shrub; buds with several imbricate scales: lvs. opposite, short-petioled, doubly serrate, stipulate: fls. solitary, white; calyx-tube flattish; sepals 4, ovate, serrate, with 4 alternate small bracts at base; petals 4, suborbicular; stamens numerous; carpels usually 4, developing into black dry drupes surrounded by the large persistent calyx. (Greek *rhodon*, rose, and *typos*, type; alluding to the resemblance of the fl. to a single rose.) One species in E. Asia.

R. scándens Mak. Upright spreading shrub to 2 m. or in Japan to 5 m.: lvs. ovate to ovate-oblong, acuminate, rounded at base, 4–8 cm. long, sharply and doubly serrate, dark green and glabrous above, lighter green and silky beneath when young; petioles 3–5 mm. long: fls. pure white, 3–5 cm. across; stamens half as long as petals, drupes obliquely short-ellipsoid, about 8 mm. long, shining black. Fl.v; fr.x. B.M.5805(c). S.Z.1:t.99(c). Gt.15:t.505. Gn.43:138. B.C.5:2949. (*R. kerrioides* Sieb. & Zucc., *R. tetrapetala* Mak.) Fl.v–vi. Japan and C. China. Intr. 1866. Zone V.—Handsome shrub with showy white fls.; the black fr. conspicuous in winter.

34. **RÚBUS** L. Deciduous or evergreen shrubs or suffruticose or herbaceous plants, with erect to trailing mostly prickly and usually short-lived stems: lvs. alternate, simple, 3-foliolate or pinnately or pedately compound, stipulate: fls. perfect, rarely dioecious, white to pink, in racemes, panicles or corymbs, or solitary, terminal or rarely axillary; calyx 5-parted, rarely 3–7-parted, with persistent lobes; petals 5, sometimes wanting; stamens many; pistils many, sometimes few, on a convex torus; styles nearly terminal; mature carpels usually drupelets, sometimes dry. (Ancient Latin name.) Including *Bossekia* Neck., *Batidea* Greene, *Melanobatus* Greene, *Oreobatus* Rydb. and *Rubacer* Rydb. More than 400 species chiefly in the colder and temp. regions of the n. hemisphere, few in the tropics and the s. hemisphere. Latest monograph by Focke in Biblioth. Bot. parts 72 and 83 (1910–14).—Shrubby or suffruticose plants cult. for their foliage or handsome fls. or for their edible fr.; the fls. appear in spring or early summer and the frs. in summer and early autumn.

The species of the subgenus Eubatus widely distributed in Europe and N. America are exceedingly polymorphous and hybridize readily which makes it almost impossible to define well marked species. In the following enumeration only the most important species are described; for other forms which may be found occasionally in special collections see Rydberg in N. Am. Fl. vol. XXII.428–480 (1913) for the American species; and Focke in Ascherson & Graebner, Syn. Mit. teleur. Fl.VI.440–648 (1902), Sudre, Rubi Europae with 215 pl. (1908–13) and Rogers, Handb. Brit. Rubi (1900) for European species; for cult. species and varieties, also Bailey, Gent. Herb.1:139–200(1923).

KEY TO THE SUBGENERA

A. Stipules broad, often dissected, free: lvs. simple or compound.
  B. Stipules persistent: lvs. simple; stems unarmed ..... I. DALIBARDASTRUM
  BB. Stipules caducous, often dissected: calyx-tube usually campanulate: stems usually prickly: lvs. simple or compound ..... II. MALACHOBATUS
AA. Stipules lanceolate to filiform, adnate to the petiole.
  B. Stems unarmed, upright, with flaky bark: lvs. simple, palmately lobed. III. ANOPLOBATUS
  BB. Stems prickly, rarely unarmed, usually biennial, upright, arching or trailing: lvs. usually compound.
    C. Fr. separating from the torus, therefore hollow: lvs. pinnate, ternate or rarely simple. IV. IDAEOBATUS
    CC. Fr. separating with the torus from the calyx, therefore not hollow; lvs. usually ternate or digitately compound ..... V. EUBATUS

KEY TO THE SPECIES

I. Dalibardastrum

A. Lvs. ternate....1. *R. nutans*
AA. Lvs. simple, cordate-ovate....2. *R. tricolor*

II. Malachobatus

A. Lvs. ternate or quinate or partly simple and deeply lobed.
B. Stipules and bracts entire or dentate....3. *R. Henryi*
BB. Stipules and bracts fimbriate-pinnate....4. *R. Playfairianus*
AA. Lvs. simple.
B. Fls. in terminal racemes.
C. Infl. glandular....5. *R. hupehensis*
CC. Infl. glandless....6. *R. malifolius*
BB. Fls. in a compound infl.
C. Lvs. not or slightly lobed.
D. Lvs. suborbicular or broad-ovate, long-petioled.
E. Lvs. reniform, rounded at apex: fls. in terminal clusters and 1 or 2 axillary. 7. *R. irenaeus*
EE. Lvs. broad-ovate, abruptly acuminate: fls. in a large terminal panicle. 8. *R. chroosepalus*
DD. Lvs. ovate to lanceolate.
E. Infl. terminal, paniculate.
F. Lvs. nearly glabrous, deeply cordate....9. *R. changensis*
FF. Lvs. pubescent or tomentose beneath.
G. Petioles 2–5 cm. long; lvs. pilose on the veins beneath 10. *R. Lambertianus*
GG. Petioles 1–2.5 cm. long: lvs. tomentose beneath, oblong-lanceolate. 11. *R. Parkeri*
EE. Infl. fasciculate, in the axils of old lvs....12. *R. flagelliflorus*
CC. Lvs. deeply lobed, mallow-like, with obtuse lobes....13. *R. omeiensis*

III. Anoplobatus

A. Lvs. large with acute lobes.
B. Lobes broadly triangular: fls. in corymbs.
C. Infl. many-fld.; fls. purple....14. *R. odoratus*
CC. Infl. few-fld.; fls. white....15. *R. parviflorus*
BB. Lobes ovate to oblong-ovate; calyx villous, glandless....16. *R. trifidus*
AA. Lvs. 3–8 cm. across, with rounded incised lobes: fls. white, solitary....17. *R. deliciosus*

IV. Idaeobatus

A. Lvs. simple.
B. Fls. solitary; lvs. tomentose beneath (glabrous in var.): petals spreading. 18. *R. corchorifolius*
BB. Fls. several: lvs. glabrous beneath or pubescent only on the veins.
C. Lvs. 5-lobed, green beneath: petals spreading....19. *R. crataegifolius*
CC. Lvs. of flowering brts. not lobed, glaucous beneath: fls. usually 3; petals and stamens upright....20. *trianthus*
AA. Lvs. compound.
B. Fls. solitary or few, rarely forming a loose, 2–8-fld. infl.
C. Lvs. always ternate, nearly glabrous: fls. solitary....21. *R. spectabilis*
CC. Lvs. pinnate, with 3–11 lfts.
D. Carpels more than 100 forming an ovoid fr.: fls. solitary or few: lfts. 5–7, lanceolate, firm, pilose only on veins beneath....22. *R. illecebrosus*
DD. Carpels 10–60, forming an hemispherical fr.
E. Fls. solitary: lfts. 7–9....23. *R. amabilis*
EE. Fls. in 2–8-fld. loose infl.: lfts. 3–5; stems white-pruinose.
F. Styles glabrous: fls. white....24. *R. biflorus*
FF. Styles pubescent; fls. reddish, small....25. *R. lasiostylus*
BB. Fls. in many-fld. usually dense infl.
C. Terminal lft. elongated, pinnately lobed....26. *R. thibetanus*
CC. Terminal lft. not elongated, serrate.
D. Petals incumbent, adpressed to the stamens.
E. Lvs. of flowering brts. 5–7-foliolate....27. *R. coreanus*
EE. Lvs. of flowering brts. ternate or occasionally quinate.
F. Plant not setose, nor stipitate-glandular.
G. Terminal lft. lobed or incised, broad....28. *R. parvifolius*
GG. Terminal lft. coarsely serrate, long-acuminate....29. *R. gracilis*
FF. Plant densely glandular and setose....30. *R. phoenicolasius*
DD. Petals erect or spreading.
E. Infl. paniculate, elongated, only at base leafy.
F. Lvs. 5–7-foliolate.
G. Lfts. white-tomentose beneath; sepals tomentose....31. *R. flosculosus*
GG. Lfts. grayish tomentose beneath: sepals pubescent at apex: stems white-pruinose....32. *R. Giraldianus*
FF. Lvs. of flowering brts. ternate, occasionally quinate.
G. Lfts. white-tomentose beneath....33. *R. innominatus*
GG. Lfts. green and villous beneath: infl. glandular....34. *R. adenophorus*
EE. Terminal infl. short, often augmented by lateral infls.

FF. Infl. loose and corymbose: stems pruinose: plant neither setose nor glandular.
G. Prickles of infl. straight, scarcely flattened: lfts. dark green above. 35. *R. occidentalis*
GG. Prickles of infl. recurved, flattened: lfts. yellowish green above, often 5. 36. *R. leucodermis*

FF. Infl. dense or with lateral brts.
G. Lvs. often quinate: infl. consisting of terminal and axillary racemes: fr. tomentulose. 37. *R. Idaeus*
GG. Lvs. all ternate: infl. without or few lateral brts.: fr. glabrous. 38. *R. mesogaeus*

V. EUBATUS

A. Fls. dioecious: lvs. ternate or pinnately quinate. 39. *R. ursinus*
AA. Fls. unisexual: lvs. ternate or digitately quinate.
B. Stems erect or ascending and arching. BLACKBERRIES.
C. Lfts. white-tomentose beneath.
D. Stem green, with hooked prickles: fls. white. 40. *R. Linkianus*
DD. Stem pruinose, with nearly straight prickles: fls. pink or pinkish. 41. *R. ulmifolius*
CC. Lvs. green beneath, pubescent or nearly glabrous.
D. Infl. densely glandular with long-stipitate glands; lvs. pubescent beneath. 42. *R. allegheniensis*
DD. Infl. not or slightly glandular; glands, if present, sessile or short-stipitate.
E. Lfts. densely pubescent beneath (slightly so in *R. nessensis* under No. 43).
F. Infl. racemose or paniculate.
G. Stem with recurved prickles.
H. Lfts. not dissected. 43. *R. fruticosus*
HH. Lfts. dissected. 44. *R. laciniatus*
GG. Stems with numerous long and straight prickles. 45. *R. argutus*
FF. Infl. short, corymbose. 46. *R. frondosus*
EE. Lvs. glabrous beneath or only sparingly pubescent on the veins: infl. racemose. 47. *R. canadensis*
BB. Stems prostrate, only the flowering brts. upright. DEWBERRIES.
C. Stipules filiform: stem prickly or setose, not pruinose.
D. Infl. with flattened prickles: lvs. persistent. 48. *R. trivialis*
DD. Infl. not prickly.
E. Stem very bristly. 49. *R. hispidus*
EE. Stem prickly; the prickles confined to the angles of the stem. 50. *R. flagellaris*
CC. Stipules lanceolate: stems pruinose with sparse weak prickles. 51. *R. caesius*

I. DALIBARDASTRUM Focke. Prostrate unarmed shrubs or subshrubs, bristly; lvs. simple or ternate; stipules broad, free; calyx setose.

1. **R. nûtans** Wall. Evergreen shrub; stems rooting, densely covered with purplish bristles; petioles bristly, 3–5 cm. long: lfts. short-stalked, rhombic or obovate, obtusish, sharply serrate and lobulate, the terminal one 3–6 cm. long, dark green and lustrous above, bristly on the veins beneath: fls. 1–3, white, about 3 cm. across, on slender bristly stalks 3–6 cm. long: fr. globose, dark purple, edible. B.M.5023(c). Himal. Cult. 1860. Zone VII?

2. **R. trícolor** Focke. Deciduous shrub; stems densely clothed with yellow-brown bristles: lvs. suborbicular to ovate, short-acuminate, cordate, 6–10 cm. long, irregularly and sharply toothed and sometimes lobulate, dark green above, white-tomentose beneath and bristly on the veins; petioles 2–3.5 cm. long, bristly: fls. white, 2–2.5 cm. across, in short terminal bristly racemes: fr. bright red, edible. Fl.VII–VIII; fr.IX. (*R. polytrichus* Franch., not Progel.) W. China. Intr. 1908. Zone VI?

II. MALACHOBATUS Focke. Evergreen or deciduous, creeping or scandent, usually prickly shrubs, rarely herbaceous: lvs. usually simple, often lobed or digitate-compound; stipules free, broad, usually cleft into narrow lobes: infl. racemose or paniculate, rarely few-fld.; fls. small; sepals unequal, erect after anthesis: fr. separating from the torus.

3. **R. Hénryi** Hemsl. Evergreen scandent shrub to 6 m. long; stems tomentose-floccose when young, with few reflexed prickles: lvs. deeply 3-lobed, rarely 5-lobed, rounded at base, 10–15 cm. long, the lobes 2–2.5 cm. wide, acuminate, remotely serrulate, white-tomentose beneath: fls. pink, nearly 2 cm. across, in terminal and axillary, glandular racemes; sepals caudate: fr. 1–1.5 cm. across, black, lustrous. Fl.VI; fr.VIII. H.I.1705. Focke,Sp.Rub.44. M.G.30:7(h). C. and W. China. Intr. 1900. Zone VI?—

Var. **bambusàrum** Rehd. Lvs. ternate; lfts. lanceolate or narrow lanceolate, very short-petiolate, 4–10 cm. long. G.C.III.42:251. S.L.372(h). (*R. b.* Focke.) C. China. Intr. 1900.

4. **R. Playfairiànus** Focke. Half-evergreen sarmentose shrub, stems dark-colored, with small hooked prickles, floccose-tomentose when young: lfts. 3–5, stalked, oblong-lanceolate, acute, rounded at base, serrate, the terminal one 6–14 cm. long, dark green above, gray-tomentose beneath: fls. 1–1.5 cm. across, in small terminal and axillary racemes; calyx densely villous, not glandular: fr. black. Fl.v–vi; fr.vii–viii. G.C.III.51:165(h),166. (*R. Playfairii* Bean, not Hemsl.) C. and W. China. Intr. 1907. Zone VI?

5. **R. hupehénsis** Oliv. Deciduous or half-evergreen shrub; stems dark-colored, thinly floccose-tomentose when young, with few curved spines: lvs. oblong-lanceolate, acuminate, rounded at base, 7–11 cm. long, unequally serrulate, gray-tomentose beneath; petiole about 1 cm. long: fls. rather small in 3–7-fld. very glandular racemes; calyx gray-tomentose: fr. purple-black, austere. Fl.vi; fr.vii–viii. G.C.III.51:166. H.I.1816. (*R. Swinhoei* Bean, not Hance.) C. China. Intr. 1907. Zone VI?

The closely related **R. Swinhòei** from Formosa is an evergreen shrub and probably not in cult.

6. **R. malifòlius** Focke. Deciduous prostrate or climbing shrub; stems with short recurved prickles: lvs. elliptic to oblong-elliptic, acuminate, rounded at base, 5–12 cm. long, remotely mucronulate-serrulate, glabrous above, puberulous on the veins beneath; petiole 5–15 mm. long: fls. about 2.5 cm. across, in terminal racemes 5–10 cm. long; calyx tomentose; petals suborbicular: fr. black, of unpleasant flavor. Fl.vi; fr.vii. H.I.1947. C. and W. China. Intr. 1904. Zone VI?—Handsome in bloom.

7. **R. irenaèus** Focke. Evergreen prostrate shrub; stems tomentose, with small prickles or unarmed: lvs. suborbicular, acuminulate or rarely rounded, broad-cordate or subcordate, 10–15 cm. across, mucronate-denticulate and usually slightly lobulate, dark green and glabrous above, whitish tomentose beneath; petioles 4–8 cm. long; stipules large, incisely dentate: fls. 1.5–2 cm. across, 1 or 2 in the axils or in several-fld. clusters; calyx tomentose: fr. red, large. Fl.vii. Focke, Sp. Rub. 115. C. and W. China. Intr. 1900. Zone VI?

8. **R. chroosépalus** Focke. Half-evergreen straggling shrub; stems with short curved prickles, puberulous when young: lvs. broad-ovate, abruptly acuminate, cordate, 7–12 cm. long, sharply and unequally serrate and often shallowly lobulate, glabrous above, white-tomentose beneath; petioles 3–6 cm. long, prickly, glabrous like the veins beneath: fls. apetalous, 1–1.5 cm. across, in large terminal panicles 12–20 cm. long; sepals tomentose outside, purple inside: fr. black, small. Fl.vii. H.I.1952. Focke, Sp. Rub. 51. G.C.III.51: 166. C. China. Intr. 1900. Zone VI?—Handsome shrub with lvs. resembling those of *Tilia tomentosa*.

9. **R. ichangénsis** Hemsl. & Ktze. Deciduous scandent or prostrate shrub; stems slender, with stipitate glands and scattered hooked prickles: lvs. ovate-lanceolate, acuminate, deeply cordate, 8–15 cm. long, remotely mucronate-serrulate and usually slightly lobulate toward the base, glabrous; petioles 2–3 cm. long, prickly like midrib beneath: fls. 6–8 mm. across, white, in slender panicles 15–25 cm. long or more; sepals erect: fr. red, small, of good flavor. Fl.vii; fr.x. Focke, Sp. Rub. 55. G.C.III.48:275(h). C. and W. China. Intr. 1900. Zone VI?

10. **R. Lambertiànus** Ser. Half-evergreen straggling shrub; stem angled, with scattered recurved prickles, tomentulose when young or nearly glabrous:

lvs. ovate to oblong-ovate, acuminate, cordate, 7–12 cm. long, crenate-dentate and sinuate-lobulate or sometimes slightly 3-lobed, slightly pilose above, pilose beneath; petioles 2–4 cm. long: fls. white, 8 mm. across, in panicles 8–14 cm. long; calyx tomentulose or nearly glabrous, often glandular; petals scarcely exceeding the sepals: fr. red, small. Fl.VIII–IX; fr.X–XI. G.C.III.48: 276(h);51:166. C. China. Intr. 1907. Zone VI?—Var. **hakonénsis** Focke. Lvs. nearly glabrous. (Var. *glaber* Bean, *R. h.* Fr. & Sav.) Japan, C. China. Intr. 1907.

11. **R. Párkeri** Hance. Deciduous climbing shrub; stems grayish tomentose, with scattered curved prickles: lvs. oblong-ovate, acuminate, cordate, 10–16 cm. long, crenate-dentate and sinuate-lobate, hirsute above, grayish or brownish tomentose beneath; petioles 5–20 mm. long, pubescent and prickly: fls. white, about 8 mm. across, in large densely villous and glandular-setose panicles; calyx with reddish glandular hairs: fr. black with few drupelets. Fl.VI; fr.VII–VIII. Focke, Sp. Rub. 66. G.C.III.51:166. C. China. Intr. 1907. Zone VI?

12. **R. flagelliflòrus** Focke. Evergreen climbing or creeping shrub; stems with very small recurved prickles, tomentulose when young: lvs. ovate to ovate-lanceolate, acute or acuminate, deeply cordate, 8–16 cm. long, crenate-serrulate, often obscurely lobulate, sparingly pilose above, yellowish tomentose beneath; petioles 3–6 cm. long, slightly bristly: fls. small, in short axillary fascicle-like racemes or clusters; sepals purple inside; petals white, quickly caducous: fr. black, edible. Fl.VI. Focke, Sp. Rub. 113. S.L.336(h). R.B.33:360,t(h). C. and W. China. Intr. 1901. Zone VII?

13. **R. setchuenénsis** Bur. & Fr. Deciduous straggling shrub; stems terete, velutinous, unarmed: lvs. suborbicular, 5- or obscurely 7-lobed, cordate, 7–16 cm. wide, lobes broad, obtuse, irregularly dentate, rugulose above, grayish tomentulose and somewhat reticulate beneath; petioles 5–7 cm. long: fls. 1–1.5 cm. across, in many-fld. panicles or partly in dense axillary clusters; calyx tomentose; sepals triangular, acute; petals purple: fr. black, of good flavor. Fl.VII–VIII; fr.IX. (*R. omeiensis* Rolfe, *R. clemens* Focke, *R. pacatus* Focke.) W. China. Cult. 1898. Zone VI?

A related species is **R. reflexus** Ker. Lvs. 3–5-lobed, with elongated acute middle lobe, fulvous-tomentose beneath. B.R.461. B.M.771(c). Hongkong. Cult. 1820. Probably not hardy within our area.

Sect. III. Anoplobatus Focke. Stems upright, rarely decumbent, with exfoliating bark, unarmed; stipules lanceolate, slightly adnate to petiole: lvs. simple, palmately lobed: fls. large, with spreading petals; styles club-shaped; torus flat.

14. **R. odoràtus** L. Deciduous upright shrub, to 3 m.; young shoots, petioles and peduncles villous and glandular: lvs. cordate, 5-lobed, 10–30 cm. broad, lobes broad-triangular, abruptly acuminate, irregularly dentate, green and pilose on both sides; petiole 2–8 cm. long, villous: fls. purple, fragrant, 3–5 cm. across, in short many-fld. panicles; sepals broad-ovate, abruptly caudate, acuminate, glandular outside; petals suborbicular: fr. red, flat, 1.5–2 cm. broad. Fl.VI–VIII. B.M.323(c). N.D.6,t.24(c). Gn.34:230. B.B.2:276. F.E.22:557(h). (*Rubacer odoratum* Rydb.) N. S. to Mich., Tenn. and Ga. Intr. 1770. Zone III.—Var. **álbidus** Bailey. With whitish fls. and lighter-colored bark. (?Var. *albus* Zabel.)—Handsome shrub with large lvs. and large purple fls.; likes shady position and humid soil.

R. o. × *parviflorus* = **R. Fràseri** Rehd. Brts. and petioles less glandular-hairy: lobes of lvs. acuminate: fls. pink fading to pale purple. G.C.III.73:50(h). (*R. robustus* G. Fraser, not Presl.) Orig. 1918. — *R. o.* × *idaeus* = *R. nobilis;* see under No 37.

15. **R. parviflòrus** Nutt. Deciduous upright shrub, to 2 m.; young brts., petioles and infl. puberulous and more or less glandular: lvs. reniform, 3–5-lobed, 6–20 cm. across, lobes triangular, short-acuminate or acute, dentate, sparingly pilose on both sides; petioles 5–12 cm. long: fls. white, 3–6 cm. across, in 3–10-fld. rather dense corymbs; sepals broad-ovate, abruptly caudate-acuminate, densely glandular outside; petals broad-oval or ovate: fr. convex, red, 1.5–2 cm. across. Fl.v–vii. B.R.1368(c). B.M.3453(c). B.B.2:276. Gn.81:31;84:339. S.L.44(h). (*R. nutkanus* Moç., *Rubacer parviflorum* Rydb.) W. Ont. and Mich. to N. Mex. and n. Mex., w. to s. Alaska and Calif. Intr. 1827. Zone IV? or III.—Var. **Fraseriànus** J. K. Henry. Petals incisely dentate: lvs. rather densely pilose beneath. Gn.82:277. Torreya,18:55. B. C. Intr. 1918.—Handsome shrub similar to the preceding, but fls. white.

16. **R. trífidus** Thunb. Half-evergreen upright shrub, to 2 m.; brts. glandular-pubescent at first, soon glabrous: lvs. suborbicular, cordate, deeply 5–7-lobed, 10–20 cm. across: lvs. oblong-lanceolate, coarsely double-serrate, slightly hairy on the veins on both sides; petioles 3–6 cm. long: fls. rosy-white, 2.5–3 cm. across, solitary in the axils and in a few-fld. terminal corymb; calyx tomentose: fr. red, edible. Fl.iv–v. R.H.1908:298. S.L.370(h). (*R. aceroides* Miq.) Japan. Intr. 1888. Zone V.

17. **R. deliciòsus** Torr. Deciduous shrub to 3 m., with spreading or arching brs.; young brts. puberulous: lvs. reniform to orbicular-ovate, truncate or cordate at base, 3–7 cm. long, with 3 or sometimes 5 broad obtuse lobes, or acute on shoots, irregularly dentate, glandular beneath and sparingly pilose on the veins; petioles 2–3.5 cm. long, puberulous: fls. mostly solitary, about 5 cm. across; sepals ovate, caudate-acuminate; petals oval: fr. hemispheric, dark purple, 1–1.5 cm. across. Fl.v. B.M.6062(c). Gt.24:t.837. R.H.1882:356. B.S.2:457. Gn.80:286(h);86:37. J.L.35:362(h). (*Oreobatus d.* Rydb.) Colo. Intr. 1870.—Var. **neo-mexicànus** Kearn. Lvs. with at least the terminal lobe acute, pubescent on both sides, reticulate-veined beneath, usually larger; petioles villous. S.H.1:f.307b(l). Card, Bush Fr. f.51. N. Mex., Ariz. and n. Mex. Intr.? Probably tenderer.—Handsome graceful shrub with large white fls.

Sect. IV. Idaeobatus Focke. Shrubs with deciduous upright or scandent or procumbent stems usually prickly, setose or glandular, usually biennial: lvs. usually ternate or pinnate, rarely digitate, sometimes simple; stipules linear, adnate: fr. of many carpels at maturity separating from the torus. Raspberries.

18. **R. corchorifòlius** L. f. Deciduous upright shrub, suckering; stems prickly, tomentulose when young: lvs. ovate-lanceolate, acuminate, cordate, 8–16 cm. long, 3-nerved at base, with several short obtuse lobes near the base or without lobes, or 3-lobed on shoots with elongated middle lobe, irregularly serrulate, pubescent on veins above, gray-tomentose beneath; petioles 5–20 mm. long: fls. white, about 3 cm. across, usually solitary or few on short lateral prickly brts.; petals oblong, little longer than the ovate, mucronate sepals: fr. bright, red, large, edible. Fl.iv; fr.vi. G.C.III.51:149. N.K.7:t,20. Japan, China. Intr. 1907. Zone VI?—Var. **Olíveri** Focke. Shoots glabrous: lvs. pubescent only on the veins beneath. (*R. O.* Miq.) China, Japan. Intr. 1907.

A related species is **R. palmàtus** Thunb. Stems glabrous, prickly: lvs. palmately 3–5-lobed, 5-nerved at base, 3–8 cm. long, lobes unequally and coarsely dentate and lobulate, nerves beneath puberulous and midrib prickly: fr. yellow, edible. B.M.7801(c). Focke, Sp. Rub. 133. Japan, China. Cult. 1899. Zone VII?

19. **R. crataegifòlius** Bge. Upright shrub to 3 m., suckering; stems prickly, grooved, brownish red, pubescent when young, branching near apex: lvs. palmately 3–5-lobed, cordate or truncate, 5–12 cm. long, those of flowering brts. smaller, 3-lobed, lobes ovate to ovate-lanceolate, acute, rarely acuminate or obtusish, unequally coarsely serrate, pubescent beneath on the veins; petioles 2–5 cm. long, prickly: fls. white, about 2 cm. across, in few- or several-fld. clusters; sepals ovate, acuminate, much recurved; petals elliptic: fr. red. Fl.VI; fr.VII. Gt.17:t.591;27:t.924. N.K.7:t.21. S.H.f.307g,309r. Japan, Korea, N. China. Intr. 1875. Zone V.—Handsome shrub, its lvs. turning red and yellow in autumn.

20. **R. triánthus** Focke. Shrub with upright arching stems; stems slender glabrous, often bloomy, prickly: lvs. oblong-lanceolate, acuminate, subcordate or truncate, 5–8 cm. long, incisely serrate, those of shoots 3-lobed and larger, the terminal lobe ovate-lanceolate, glabrous, pale or whitish beneath, with 8–12 pairs of veins; petioles 1–4 cm. long, glabrous, prickly like the veins beneath: fls. usually 3, white, 1 cm. across, on pedicels 1–2 cm. long; sepals triangular, caudate-acuminate, glabrous outside, tomentose inside: fr. small, red. Fl.V; fr.VII. Focke, Sp. Rub. 139. (*R. conduplicatus* Rolfe.) China. Intr. 1907. Zone (V).

A closely related species is **R. Koenneànus** Focke. Stems upright, sparingly and minutely prickly: lvs. ovate, 3- or rarely 5-lobed, 4–12 cm. long, the terminal lobe usually ovate and acuminate; petioles often nearly as long as blade: fls. nearly 2 cm. across: fr. orange, small. B.M.8246(c). Focke, Sp. Rub. 141. Gt.53:555. (*R. incisus* Spaeth, not, Thunb., *R. morifolius* hort., not Sieb.) Japan. Intr. 1890. Zone V?

21. **R. spectàbilis** Pursh. Stems upright, to 2 m., glabrous, with numerous fine prickles below: lfts. 3, ovate, 10–15 cm. long, incisely serrate, nearly glabrous, the terminal lft. the largest, rhombic-ovate, stalked, lateral lfts. nearly sessile: fls. solitary, purplish-red, 2.5 cm. across, nodding, fragrant, on short lateral brts.; calyx pubescent; sepals triangular-ovate, half as long as petals: fr. orange, large, edible. Fl.IV–VI. B.R.1424(c). L.B.1602(c). Proc. Iowa Acad. Sci.23,t.26. W. N. Am. Intr. 1827. Zone V.

A related species is **R. maciléntus** Cambess. Stems with stout straight or hooked prickles: lvs. prickly; terminal lft. 5 cm. or less long: fls. white, usually 3: fr. orange or red, inclosed in the calyx. Himal. Intr. 1908. Zone VII?

22. **R. illecebròsus** Focke. STRAWBERRY-RASPBERRY. Suffruticose or nearly herbaceous; stems upright, to 1 m., angular, glabrous, prickly: lvs. pinnate; lfts. 5–7, 3 at end of brts., oblong-lanceolate, acuminate, 4–8 cm. long, doubly serrate, glabrous except pilose on veins beneath; petiole and rachis prickly: fls. solitary or few, bracted, white, 4 cm. across; pedicels prickly, glabrous: fr. scarlet, large. Fl.VII–X. G.C.III.20:82. Gn.64:412. Gt.47:27. G.W.4:233. (*R. sorbifolius* hort., not Maxim.) Japan. Cult. 1895. Zone (V).—Particularly handsome with its large scarlet fr.

The closely related **R. rosaefòlius** Sm. is probably not hardy within our area: stems taller, pubescent: lfts. 5–11, pubescent below: fls. larger, sometimes double (var. *coronarius* Ser. B.M.1783): fr. smaller. H.I.349. B.M.6970(c). Himal., S. Asia.—A species similar in habit, though belonging to sect. CYLACTIS is **R. xanthocárpus** Bur. & Franch. Herbaceous: lateral lfts. several times smaller than terminal lft. and obtusish: fls. smaller, 1–3: fr. yellow. W. China. Intr. 1885. Zone IV.

23. **R. amàbilis** Focke. Stems to 2 m., slightly prickly, unarmed above: lvs. pinnate; petiole and rachis with subulate prickles; lfts. 7–9, ovate to ovate-lanceolate, incisely double-serrate, pubescent on the veins and usually prickly beneath, terminal lft. 2.5–6 cm. long, acuminate, lateral lfts. smaller, usually acute: fls. solitary, white, 4–5 cm. across, nodding; pedicels silky-pubescent and prickly; sepals broad-ovate, cuspidate; petals suborbicular,

overlapping: fr. large, red, edible. Fl.VI–VII; fr.VIII. Focke, Sp. Rub. 164. W. China. Intr. 1908. Zone VI?—Graceful shrub with conspicuous white fls. and comparatively small lfts.

A closely related species is **R. púngens** Cambess. Lfts. 5–7, rarely 9, somewhat smaller: petiole and rachis with hooked prickles: fls. 1–3, smaller; sepals ovate to ovate-lanceolate, acuminate; petals obovate to oblong, 1–1.2 cm. long: fr. smaller. Jacquemont, Voy. Inde,4:t.59. Himal., China, Japan. Intr. 1907. Zone VI?

24. **R. biflòrus** Buch.-Ham. Stems to 3 m., with straight prickles, glaucous-white like the upper brts.: lfts. 3–5, ovate or elliptic, acute or acuminate, 4–10 cm. long or the lateral ones smaller, incisely and irregularly serrate, white-tomentose beneath; petiole and rachis prickly: fls. 1–3, white, 2 cm. across: fr. yellow, roundish, 2 cm. across, edible. Fl.V–VI. B.M.4678(c). R.H.1855,t.5(c). Gn.54:456. Himal. Intr. 1818. Zone VII?—Var. **quinqueflòrus** Focke. Taller and more vigorous: fls. usually 5, or sometimes to 8. G.C.III.66:212;73:23. Gn.76:624(h);83:594;89:329(h). W. China. Intr. 1908. Zone VI?—A very striking plant with its conspicuous white stems.

25. **R. lasiòstylus** Focke. Stems upright, to 2 m., with bristle-like prickles, glaucous-white: lfts. 3–5, the lateral acute, 5–10 cm. long, the terminal one much larger, acuminate, rounded or subcordate at base, often 3-lobed, unequally double-serrate, white-tomentose beneath: fls. 1–5, nodding, rather small; pedicels bristly; bracts large; petals reddish, shorter than the ovate-lanceolate cuspidate sepals: fr. subglobose, red, tomentulose. Fl.VI; fr.VIII. B.M.7426(c). H.I.1951. G.C.III.51:167. Focke, Sp. Rub. 168. G.28:631. S.L.373(h). C. China. Intr. 1889. Zone (V).—Handsome and striking plant with its white stems; hardier than the preceding species.

26. **R. thibetànus** Franch. Stems upright, with straight slender prickles: lfts. 7–13, incisely serrate, silky above, white or grayish-tomentose beneath, lateral lfts. elliptic to oblong, cuneate, 2–5 cm. long, terminal lft. longer, lanceolate, pinnatifid below; fls. 3–8 and sometimes some solitary ones in the axils below, 1–1.5 cm. across, purple; rachis and pedicels villous: fr. subglobose, black, bloomy. Fl.VI; fr.VIII. Focke, Sp. Rub. 180. G.C.III. 51:149. (*R. Veitchii* Rolfe.) W. China. Intr. 1904. Zone VI?—Very distinct and attractive shrub.

27. **R. coreànus** Miq. Stems upright or arching, to 3 m. long, angled, with stout prickles, bloomy: lfts. 5–7, ovate or elliptic, acute, broad-cuneate or rounded at base, 3–7 cm. long, unequally and sharply serrate, pubescent on the veins beneath or white-tomentose; petiole and rachis prickly: fls. rather small, in corymbs 3–7 cm. across; petals pink, shorter than the ovate-lanceolate pubescent sepals: fr. small, red or black. Fl.V–VI; fr.VII–VIII. N.K.7:t.29. G.C.III.51:149. Korea, Japan, China. Cult. 1906. Zone V?

Related species are: **R. inopértus** Focke. Lfts. 7–9, ovate to oblong-ovate, usually long-acuminate, glabrous or slightly pubescent: fls. in dense fascicles; calyx glabrous: fr. red. C. & W. China. Intr. 1908.—**R. Wilsònii** Duthie. Stems very prickly, the angles below the nodes nearly winged: lfts. 3–5, coarsely double-serrate, glabrous, terminal lft. broad-ovate, rounded or subcordate at base: fls. purple, in axillary fascicles and a dense terminal panicle; calyx purple-brown outside. C. China. Intr. 1901.

28. **R. parvifòlius** L. Stems rather low, arching, short-villous, prickly: lfts. 3, on shoots occasionally 5, usually broadly obovate or suborbicular, obtusish, rarely ovate and acute, lateral lfts. often elliptic, 2–5 cm. long, unequally dentate, terminal lft. often lobulate, strigose-pilose above, white-tomentose beneath: fls. rather small, in prickly and pubescent small corymbs or short racemes, partly axillary; calyx green outside; sepals spreading, later recurved; petals upright, pink or purplish: fr. roundish, red, edible. Fl.VI;

fr.VII–VIII. B.R.496(c). N.K.7:t.31. (*R. triphyllos* Thunb.) China, Japan. Intr. 1818. Zone V.

A related species is **R. telédapos** Focke. Lfts. usually ovate or oblong-ovate, acuminate, terminal lft. often nearly 3-lobed: infl. elongated: fr. dark red. W. China. Intr. 1908.

29. **R. gracilis** Roxb. Stems stout, erect, to 5 m. tall, sometimes sarmentose, densely velvety when young, with few minute prickles: lfts. 3–5, coarsely double-serrate, strigose-pilose above at first, later glabrescent, white-tomentose beneath, terminal lft. broad-ovate to oblong-ovate, acuminate, rounded or subcordate, 8–12 cm. long, lateral lfts. much smaller, obliquely ovate, nearly sessile: fls. white or pale pink, 1–1.5 cm. across, in few-fld. corymbs; petals obovate, shorter than the lanceolate sepals: fr. blue-black, small. Fl. VI–VII. (*R. niveus* Wall., not Thunb., *R. euleucus* Focke.) Himal., China. Intr. 1901 from China. Zone VII?—The most robust of all Rubus.

30. **R. phoenicolàsius** Maxim. Stems upright, to 3 m. high, densely covered with reddish gland-tipped bristles and a few slender prickles: lfts. 3, rarely 5, broad-ovate, acuminate, 4–10 cm. long, coarsely and unequally mucronate-serrate, slightly pilose above, white-tomentose beneath: fls. in densely pilose and glandular short racemes and partly axillary; petals pink, shorter than the pilose sepals: fr. semiglobose, red, small, acid or insipid, with enlarged spreading bristly calyx. Fl.VI–VII. B.M.6479(c). G.C.III.11: 269;28:137. Gt.52:564. N.K.7:t.28. Gng.3:263. Korea, Japan. N. China; occasionally escaped in E. U. S. Intr. 1876. Zone V.—Handsome shrub conspicuous on account of the dense bristly pubescence of its stems.

R. p. × *idaeus* = **R. Páxii** Focke. Lfts. often 5, narrower, acute, less deeply serrate. Cult. 1906.

31. **R. flosculòsus** Focke. Stems usually arching, to 3 m. long, with few prickles, puberulous or glabrous, usually purplish brown, often bloomy: lfts. 5–7, usually ovate-oblong, acuminate, 3–5 cm. long, subequally serrate, terminal lft. often rhombic-lanceolate, to 7 cm. long and doubly serrate above the middle, white-tomentose beneath: fls. small, pink, 6–8 mm. across, in narrow panicles 5–10 cm. long; calyx tomentose; petals slightly longer than sepals: fr. small, dark red or black. Fl.VI; fr.VIII. Focke, Sp. Rub. 193. C. China. Intr. 1907. Zone V–VI.—Var. **parvifòlius** Focke. Lfts. 1–2 cm. long. —Graceful shrub with slender arching stems rooting at the tips in autumn.

32. **R. Giraldiànus** Focke. Stems upright, to 3 m. long, branching and curving above, white-glaucous, sparingly prickly: lfts. 7–9, oblong-lanceolate, unequally coarsely serrate, white-tomentose beneath, terminal lft. rhombic or ovate-lanceolate, often lobulate, acuminate; petiole and rachis prickly: fls. small, rose-purple, in terminal panicles 10–12 cm. long: fr. black. Fl.VI; fr.VIII–IX. Focke, Sp. Rub. 194. G.C.III.51:147;65:248(h). Gn.76:624(h). J.L.40:218(h). N. and C. China. Intr. 1907. Zone V.—Conspicuous with its white stems.

33. **R. innominàtus** S. Moore. Stems upright, to 3 m., densely glandular-villous and prickly: lfts. 3–5, irregularly coarsely serrate, slightly pilose above, grayish white-tomentose beneath; lateral lfts. obliquely oblong-ovate, rounded at base, 5–10 cm. long, terminal lft. ovate, acuminate, subcordate, larger; petiole villous and prickly: fls. pink, about 1 cm. across, in glandular-villous panicles 25–35 cm. long: fr. orange-red, about 1.5 cm. wide, edible. Fl.VII–VIII; fr.IX. G.C.III.38:290. R.B.33:360(h). C. and W. China. Intr. 1901. Zone VI?—Var. **Kuntzeànus** Bailey. Stems and infl. glandless. S.L. 375(h). (*R. K.* Hemsl.) C. China Intr. 1907.—Remarkable for its large infl.; may be valuable for its fr.

34. **R. adenóphorus** Rolfe. Stems upright, to 3 m., stout, densely villous and stipitate-glandular like the petioles, with stout broad-based prickles: lfts. 3, often 5 on shoots, ovate, acuminate, rounded at base, 5–12 cm. long, the terminal lft. subcordate, doubly serrate, dull and pubescent above, more densely pubescent and grayish green beneath: fls. pink, small, in villous and stipitate-glandular panicles 10–12 cm. long: fr. black, edible. Fl.VII; fr.VIII. Focke Sp. Rub. 197. (*R. sagatus* Focke.) C. China. Intr. 1907. Zone VI or VII.—Vigorous shrub with large lvs. remarkable for its conspicuous glandular pubescence on stem and infl.

35. **R. occidentàlis** L. Stems to 3 m., very glaucous and often purplish, with short prickles: lfts. 3, sometimes 5 on shoots, ovate, abruptly acuminate, rounded or cordate at base, 5–8 cm. long, doubly serrate, white-tomentose beneath; petiole sparingly prickly: fls. white, 1–1.5 cm. across, in tomentose and prickly few-fld. corymbs; petals elliptic, shorter than the ovate-lanceolate sepals: fr. hemispherical, purple-black, bloomy. Fl.V–VI; fr.VII–VIII. B.B. 2:277. B.C.5:f.3495, 3496. Jour. Hered. 11:178. N. B. to Minn. and s. to Ga. and Colo. Cult. 1696. Zone IV or III.—Var. **pállidus** Bailey. Fr. amber-yellow. Gt.19:t.670(c).—Sometimes cult. for its fr.

R. o. × *idaeus* var. *strigosus* = **R. negléctus** Peck. Similar to the preceding, but petioles and infl. more or less glandular-hispid. B.B.2:277. B.C.5:f.3494. Occurs naturally; sometimes cult. with purple to yellow fr., e.g. "Royal," "Columbia Purple Raspberry" (Jour. Hered.11:182).

36. **R. leucodérmis** Dougl. Stems upright, to 2 m., glaucous, armed with flattened recurved prickles: lfts. 3, on shoots often 5, coarsely double-serrate, white-tomentose beneath, terminal lft. broad-ovate, acute, often subcordate, 6–10 cm. long, lateral lfts. narrower, rounded at base; petiole and midrib beneath prickly: fls. white, in few-fld. tomentose and prickly corymbs; petals shorter than the lanceolate sepals: fr. hemispheric, purple-black, bloomy, edible. Fl.V–VI. Card, Bush Fr. f.59. S.H.1,f.307n. M.G.16:429(h). (*R. occidentalis* var. *l.* Focke.) B. C. to Mont., Utah and C. Cal. Intr. 1829. Zone V.—Horticultural varieties are grown for their fr.

37. **R. idaèus** L. Stems upright, to 2 m., finely tomentose when young and sometimes with a few prickles broad at base: lfts. 3, on shoots usually 5, coarsely double-serrate, finely pubescent or glabrescent above, white-tomentose beneath, terminal lft. broad-ovate, short-acuminate, often subcordate, 5–10 cm. long, lateral lfts. smaller, rounded at base; fls. white, small, in tomentose glandless and usually slightly prickly short racemes, usually with smaller axillary infl. beneath; petals shorter than the long-acuminate sepals: fr. red. Fl.V–VI; fr.VII–VIII. S.E.3:t.442(c). F.D.25:t.2575(c). Circumpolar very variable species, of which the following varieties are cult.—Var. **vulgàtus** Arrhen. The typical form described above with the infl. without glands or bristles: fr. thimble-shaped. Eu., rare in N. Am., but much cult. in various horticultural forms and often escaped from cult.—Var. **aculeatíssimus** Reg. & Tiling. Young stems glabrous and often glaucous, bristly and usually with strong prickles broad at base. Ill. Monatsh. Gartenb. 1894: t.(c). (*R. melanolasius* Focke, *R. i.* var. *m.* Focke.) B. C. to Mich., s. to Ore. and Colo., also in E. Asia. Intr. before 1894.—Var. **strigòsus** Maxim. Young shoots glabrous and often glaucous, densely bristly and often glandular, with or without bristle-like prickles: infl. glandular and prickly: fr. hemispherical. B.B.2:277. Card, Bush Fr. f.58. (*R. s.* Michx.) Nfdl. to B. C., s. to Va. and Wyo.; also in E. Asia.—Var. **álbus** Fern. Form of the preceding var. with amber-yellow fr. (*R. strigosus* var. *a.* Fuller.)—Var.

tónsus Fern. A form with smooth not bristly shoots. Que. to Vt.—Var. **canadénsis** Richards. Young shoots cinereous-tomentulose, with bristle-like prickles. (*R. subarcticus* Rydb., *R. carolinianus* Rydb.) Lab. to Alaska, s. to N. C. and Colo., also in E. Asia.—Many horticultural forms of the European type and also of var. *strigosus* are cult. for their fr.

R. i. × *odoratus* = **R. nôbilis** Reg. in habit and fl. it resembles *R. odoratus*, but the lvs. are 3-foliolate, large, pubescent on both surfaces. Orig. about 1855.—*R. i.* × *phoenicolasius* = *R. Paxii;* see under No. 30.—*R. i.* × *occidentalis* = *R. neglectus;* see under No. 35.—*R. i.* × ? *ursinus* = *R. loganobaccus;* see under No. 39.—A hybrid with an unknown English Blackberry is shown in G.C.III.22:236. B.C. 5:3021.

38. **R. mesogaèus** Focke. Stems long and slender, terete, densely tomentose, with small prickles: lfts. 3, unequally coarsely serrate, lobulate, pubescent above at first, finally glabrescent, grayish or whitish tomentose beneath, terminal lft. elliptic or rhombic-ovate, acuminate, rounded or subcordate, 5–8, on shoots to 16 cm. long, lateral lfts. smaller, obliquely elliptic, very short-stalked; petioles 2–4 cm. long, prickly; stipules on shoots dissected: fls. white or pinkish, small, in rather loose or sometimes compact corymbs; petals obovate, 6–8 mm. long; sepals lanceolate: fr. small, globose, black. Fl.v–vi; fr.viii. Focke, Sp. Rub. 205. C. China. Intr. 1907. Zone VI.

Sect. V. Eubatus Focke. Stems usually angled, rarely terete, prickly, usually biennial: lvs. ternate, or digitately 5-foliolate, rarely 7-foliolate (pinnate in No. 39); stipules adnate to petiole; petals always present; fr. falling off together with the torus, usually black or dark purple. Blackberries.

39. **R. ursìnus** Cham. & Schlecht. "Californian Dewberry." Evergreen; stems trailing, sometimes upright, pubescent when young, with straight prickles: lfts. 3 or sometimes 5, the upper ones simple; lfts. broad-ovate, acute, rounded at base, 3–6 cm. long, coarsely double-serrate, pubescent above, villous or white-tomentose beneath: fls. dioecious, white, in tomentose and prickly corymbs; sepals ovate, abruptly caudate-acuminate; petals of male fls. about 1 cm. long, of female 6–8 mm. long: fr. black, usually oblong, pubescent. Calif. Intr.? Zone V.—Var. **vitifòlius** Focke. Lvs. of flowering brts. usually simple, 3-lobed, green and sparingly pubescent on both sides or finally glabrate. (*R. v.* Cham. & Schlecht.) Calif. Cult.?

R. ? *u.* × *idaeus* = **R. loganobâccus** Bailey. Loganberry. Lvs. on shoots mostly 5-pinnate; lfts. larger, densely pubescent or tomentose beneath: fls. large: fr. purplish red, separating from the calyx with the torus. Orig. 1881.—A hybrid of *R. u.* with a Blackberry is the "Mammoth Blackberry" with very large black fr. Orig. about 1890.

A closely related species is **R. macropétalus** Dougl. Lfts. 3, sparsely appressed-hirsute, incisely dentate: fls. large, white: fr. glabrous. Hooker, Fl. Bor. Am.1:t.59. B. C. to Calif. and Idaho.—Several horticultural vars. cult. for the fr.

40. **R. Linkiànus** Ser. Stems robust, grooved, glabrous or glabrescent, with scattered reflexed prickles: lfts. 5, coarsely doubly serrate, glabrous above, white-tomentose beneath; terminal lft. ovate or broad-ovate, rounded or subcordate at base, acute or short-acuminate, on a stalk 3–4 cm. long; lateral lfts. elliptic, the outer ones nearly sessile; petiole and petiolules villous and beset with strong reflexed prickles: fls. white or pinkish, double, about 2.5 cm. across, in villous and prickly panicles sometimes to 18 cm. long; sepals ovate, acuminate, tomentose outside: fr. rarely developed. Fl.vii. G.W.17:553. (*R. fruticosus plenus* West., *R. fruticosus fl. pleno* hort., *R. hedycarpus* Zabel.) Cult. before 1770.

A closely related species is **R. cándicans** Weihe. Prickles slenderer: lfts. narrower: fls. white or pinkish, single: fr. subglobose purplish black. Sudre, Rub. Eur. t.95. (*R. thyrsoideus* Wimm.) Eu.—This is perhaps not specifically different from *R. Linkianus*, also *R. thyrsanthus* Focke belongs here.—Another related species is **R. procèrus** P. J. Muell. Vigorous plant with very prickly shoots tomentose when

young, becoming glabrous: lfts. 5, broad-elliptic-ovate, tomentose beneath: fls. about 2.5 cm. across in white-tomentose panicles; stamens very large. Sudre, Rub. Eur.t.91. (*R. macrostemon* Focke.) Eu. Here probably belongs the Himalaya-berry, intr. about 1890 to Am.

41. **R. ulmifòlius** Schott. Half-evergreen; stems arching, robust, grooved, pruinose and stellate-pubescent toward the apex, with broad-based prickles, straight on the stems, curved on the brts.: lfts. 3–5, stalked, sharply and toward the apex doubly serrate, dark green and glabrous or slightly pubescent above, white-tomentose beneath, terminal lft. broad-ovate or obovate, 3–8 cm. long; petioles with hooked prickles: fls. rosy-red in long thyrsoid tomentose panicles with hooked prickles; petals obovate to suborbicular; sepals reflexed; fr. ovoid or subglobose, small. Fl.VI–VII; fr.VIII. Sudre, Rub. Eur. t.77. (*R. rusticanus* Merc.) Eu.—Var. **bellidiflòrus** Voss. Fls. double, in long and slender panicles: petals narrow-oblong to linear-oblong, very numerous. Fl.VII–VIII. Gn.84:No.2543,i. (*R. b.* Kirch.) Cult. 1864. Very handsome form.—Var. **inérmis** Focke. Without prickles: lfts. usually 3: fls. normal. (*R. i.* Willd., ?*R. fruticosus i.* West.) Cult. 1770.—"Burbank's Thornless" belongs here.—Var. **variegàtus** Rehd. Lfts. variegated with bright yellow along the veins. (*R. u. foliis variegatis* Bean, ?*R. fruticosus v.* West.)

42. **R. allegheniénsis** Porter. Stems erect, glandular-pubescent, with stout usually straight prickles: lfts. 5, on flowering shoots 3, ovate, abruptly acuminate, rounded or subcordate at base, 4–20 cm. long, doubly serrate, slightly pilose above, soft-pubescent beneath, with 10–14 pairs of veins; midrib beneath and petiole villous, glandular-hispid and prickly: fls. white, in villous and glandular-hispid racemes 10–20 cm. long; sepals ovate; petals elliptic, 1–1.5 cm. long: fr. hemispheric to elongate, 1–1.5 cm. long, black, sweet. B.B.2:280. B.C.5:f.3500. Brainerd & Peitersen, Blackb. N. N. Eng. t.7–9. N. S. to N. C. and Ark. Cult. 1905. Zone III.

Here may be mentioned **R. platyphýllos** K. Koch. Stems vigorous, thick, densely glandular-setose and prickly: lfts. 3, rarely 5, broad-ovate, unequally serrate, pilose on both sides: fls. in lax glandular-setose panicles leafy below: fr. oblong, up to 3 cm. long, dark violet-purple, edible. R.H.1906:570,t(c). Cauc. Cult. 1904.

43. **R. fruticòsus** L. Stems upright, glabrous, with hooked prickles: lfts. plicate, green and pubescent on both sides, later glabrate above, soft-pubescent beneath, terminal lfts. broad-ovate, cordate, lateral lfts. narrower, smaller: fls. white or pink, in pubescent and sparingly prickly, rather few-fld. racemose corymbs; petals obovate or suborbicular; fr. hemispherical, black. Fl.VII; fr.VIII. F.D.t.2580(c). Weihe & Nees, Rub. Germ.t.1. Sudre, Rub. Eur. t.4. (*R. plicatus* Weihe & Nees.) Eu.—Linnaeus included in *R. fruticosus* almost all European Blackberries, but *R. plicatus* is generally considered as representing the type of Linnaeus' species.

Related species are: **R. vulgàris** Weihe & Nees. Stems glandular above: lfts. coarsely or doubly serrate, soft-pubescent or grayish tomentose beneath, terminal lft. rhombic-elliptic to obovate-oblong, 8–10 cm. long, long-stalked, lateral lfts. often obovate and cuneate; fls. white or pinkish white, in panicles; petals oblong: fr. globose. Focke, Sp. Rub.357. Sudre, Rub. Eur.t.12. (*R. Lindleyanus* Lees.) Eu.—**R. macrophýllos** Weihe & Nees. Stems arching and prostrate at ends or scandent, angled, villous when young, with short prickles: lfts. not plicate, large, cuspidate, pubescent beneath chiefly on veins: infl. usually large, paniculate, densely villous: fls. white or sometimes tinged pink. Weihe & Nees, Rub. Germ. t.12. Eu.—Var. **amplificàtus** Bab. Lfts. pubescent only on the veins beneath, the terminal one orbicular-obovate, sometimes subcordate: panicle leafy, large. Eu. Cult. 1922.—**R. nessénsis** W. Hall. Stems upright, arching at apex; prickles small

straight: lfts. 5–7, rarely 3, sharply serrate, glabrous and lustrous above, sparingly pilose beneath, terminal lft. long-acuminate, cordate: fls. white or pinkish, in few-fld. usually unarmed racemes; sepals green; petals elliptic, 1.2 cm. long: fr. dark red. Focke, Sp. Rub.97,98. Sudre, Rub. Eur.t.1. (*R. suberectus* G. Anders.) Eu.

44. **R. laciniàtus** Willd. Stems arching or scandent, angled, soon glabrous, with hooked prickles: lfts. usually 5, pinnately lobed, with incisely toothed lobes, pubescent beneath; petiole and midrib beneath prickly: fls. pinkish white, in large villous and prickly panicles; petals obovate, sometimes lobed, 1 cm. long: fr. subglobose, 1.2–1.5 cm. long, black, sweet. Fl.VI–VII; fr.VIII–IX. G.O.t.41(c). B.C.5:3030. Gn.21:57. (*R. fruticosus l.* West., *R. vulgaris* var. *l.* Dipp.) Orig. before 1770; often escaped from cult.—Var. **élegans** Bean. Lfts. smaller, more hairy above. (*R. laciniatus minor* Hort.)

45. **R. argùtus** Link. Stems upright and recurving, strongly angled and curved, glabrous, copiously armed with stout flattened prickles: lfts. 5, on flowering brts. 3, ovate, short-acuminate, rounded, terminal lft. usually subcordate at base, 6–10 cm. long and long-stalked, the outer lfts. subsessile, sharply and doubly serrate, glabrous or sparingly pubescent above, soft-pubescent beneath; petiole and midrib beneath with curved prickles: fls. white, in short prickly racemes; petals suborbicular; sepals ovate, abruptly acuminate: fr. thimble-shaped, 1–1.2 cm. long, black, glabrous. Fl.VI; fr.VII. Bailey, Evol. Nat. Fr. f.64. Brainerd & Peitersen, t.10. B.C.ed.1,4;f.2208. (*R. Andrewsianus* Blanch., *R. amnicola* Blanch.) N. S. to N. C., Kans. and Iowa. Cult. 1822. Zone III.

A related species is **R. pergràtus** Blanch. Stems recurving, with smaller prickles: lfts. often oblong-ovate: infl. not prickly. Brainerd & Peitersen, Blackberr. N. Eng.t.11. N. Eng.

46. **R. frondòsus** Bigel. Stems erect or recurved, glabrous, with rather stout straight or slightly recurved prickles: lfts. usually 5, thickish, sharply double-serrate, abruptly acuminate, sparingly hairy or nearly glabrous above, soft-pubescent beneath, terminal lft. suborbicular, cordate, 8–14 cm. long, its stalk 3–5 cm. long, lateral lfts. smaller, broad-elliptic, rounded or broadly cuneate at base, their stalk 1 cm. or less: flowering brts. villous: lfts. usually 3, elliptic or obovate, 3–7 cm. long: fls. white, in leafy villous and eglandular corymbs; petals broadly oval or suborbicular, about 1 cm. long, sepals broad-ovate, short-acuminate: fr. black, 1.5 cm. long, glabrous. Fl.VI; fr.VII–VIII. B.B.2:279. Brainerd & Peitersen, Blackberr. N. Eng. t.12. (*R. recurvans* Blanch., *R. arundelianus* Blanch.) Ont. to Va., Kans. and Iowa.—Several named horticultural vars. belong here.

A related species is **R. flòridus** Tratt.; it differs chiefly in the flattened strongly curved prickles of the stem, in the narrower generally oblong-ovate lfts. of the shoots, glabrescent at maturity. Bailey, Evol. Nat. Fr. f.90, 91. S.H.1:f.310g-g¹. (*R. argutus* var. *f.* Bailey.) S. E. Va. to Mo., Tex. and Fla.

47. **R. canadénsis** L. Stems upright, recurving, to 4 m. long, grooved and round-angled, finely puberulous at first, purplish, with few weak prickles or without: lfts. on shoots usually 5, thin, glabrous or pubescent on the veins beneath, ovate, or obovate, abruptly long-acuminate, rounded or subcordate, sharply serrate, terminal lft. 7–15 cm. long, on a stalk 2–8 cm. long, outer lfts. nearly sessile; petiole 5–10 cm. long, glabrous, unarmed; lfts. on brts. usually 3, acute: fls. white, in villous or hairy leafy racemes 8–15 cm. long; sepals ovate, short-acuminate; petals obovate, 1–1.5 cm. long: fr. roundish, black, sour. Fl.VI; fr.VII. B.M.8264(c). B.B.2:279. Gn.84:338(h). (*R. Millspaughii* Britt., *R. amabilis* Blanch.) Nfdl. to N. C. and Mich.

A related species is **R. Rândii** Rydb. differing chiefly in the lower, slenderer, terete and almost herbaceous stems, the narrower and smaller lfts. and the rather

few-fld. infl. Bailey, Gent. Herb.1:184. (*R. argutus* var. *R.* Bailey). N. S. to Mass. and N. Y.

48. **R. triviàlis** Michx. Southern Dewberry. Half-evergreen; stems prostrate and trailing, hispid and with small slightly flattened prickles: lfts. 3–5, narrow-ovate to oblanceolate, acute, rounded at base, sharply serrate, 2–6 cm. long, glabrous, dark green and lustrous above; petiole and petiolules and often the midrib beneath with recurved prickles; lfts. of brts. smaller, more elliptic and obtuse: fls. usually solitary; peduncles 2–5 cm. long, tomentulose and prickly; petals obovate, 1–1.5 cm. long: fr. usually oblong, 1–1.5 cm. long, glabrous. Fl.iv–v; fr.vi. G.O.t.71(c). B.B.2:281. Card, Bush Fr. f.63. Va. to Fla., Tex. and Okl. Cult. 1825. Zone VI?—Sometimes cult. south for its fr.

49. **R. hìspidus** L. Swamp Dewberry. Half-evergreen; stems prostrate, to 1.5 m. long, densely reflexed-bristly: lfts. 3, rarely 5, firm, coarsely and doubly serrate, glabrous, dark green above, middle lft. rhombic-ovate, acute or short-acuminate, broad-cuneate, 3–6 cm. long, short-stalked, lateral lfts. oblique, broad-ovate, nearly sessile; lfts. of brts. usually rounded at apex: fls. white, in tomentulose and bristly or unarmed few-fld. corymbs; petals obovate, 8 mm. long: fr. purple, with few glabrous druplets. Fl.vi–vii; fr. viii. B.B.2:281. B.C.5:3033. Brainerd & Peitersen, Blackberr. N. Eng. t.18. (*R. obovalis* Michx., *R. sempervirens* Bigel.—Running Blackberry.) N. S. to Ga., Mich. and Minn.—Sometimes used as a ground-cover.

A closely related species is **R. setòsus** Bigel. Stems at first erect, later reclining or decumbent: lfts. narrower, not evergreen: fls. smaller, in elongated glandular-hispid racemes: fr. red. Brainerd & Peitersen, Blackberr. N. Eng.t.17. Mass. to Conn. and N. Y.

50. **R. flagellàris** Willd. Stems prostrate, to 2 m. long, glabrous, with scattered weak recurved prickles: lfts. on shoots 3–5, abruptly acuminate, rounded or broad-cuneate, 4–10 cm. long, coarsely double-serrate, sparingly hairy above, pubescent on veins beneath, terminal lft. broad-ovate or rhombic-ovate, on a stalk 1–2 cm. long; lateral lfts. ovate, subsessile: petiole 3–5 cm. long, like midrib beneath prickly; floral brts. sparingly villous, their lfts. obovate to oblanceolate, 3–5 cm. long, acute at ends: fls. solitary or rarely in 2–4-fld. cymes; pedicels sparingly villous; sepals ovate, acuminate, sparingly villous outside; petals elliptic-obovate, 1–1.5 cm. long: fr. hemispheric to thimble-shaped, 1–1.5 cm. long, black, glabrous. Fl.v–vi; fr.vii–viii. B.B.2:281. B.C.5:f.3501, 3502. Brainerd & Peitersen, Blackberr. N. Eng. t.19. (*R. procumbens* Muhl., *R. trivialis* Pursh in part, not Michx., *R. canadensis* Torr. & Gr., not L., *R. villosus* Bailey, not Ait., nor Thunb.) Me. to Minn., Mo. and Va.—Var. **invìsus** Bailey. Stems somewhat ascending, but soon decumbent: lfts. nearly simply serrate, with short and broad apiculate teeth, usually light-colored. B.C.5:f.3503, 3504. A.G.12:81,84. (*R. canadensis* var. *i.* Bailey, *R. i.* Brit.) Ont. to Mich. and Mo.—Var. **roribáccus** Bailey. Lucretia Dewberry. Lfts. cuneate-obovate, larger and thinner: fls. large, more numerous, on long sparingly glandular stalks: fr. large. A.G.11:641,t. Bailey, Gent. Herb. 1:160. Mass. to Va. and Minn.

Related species are: **R. vèlox** Bailey. Robust plant with arching and prostrate angled stems armed with broad-based stout curved prickles: lfts. soft-pubescent beneath, the terminal one long-stalked: fls. solitary or in a forked cyme: fr. oblong, 2.5–3 cm. long. Bailey, Gent. Herb.1:168, 169. ? Tex. Several forms cult. for the fr.—**R. plicatifòlius** Blanch. Stems terete, with small prickles: lvs. of shoots nearly all 5-foliolate; lfts. large, with impressed veins, as if plaited: infl. cymose. (? *R. villosus* Ait., not Thunb.) N. E. States.

52. **R. caèsius** L. European Dewberry. Prostrate shrub; stems at first upright, soon procumbent and sometimes climbing, terete, glabrous or rarely slightly puberulous, pruinose, with scattered weak prickles: lfts. 3, rarely 5, coarsely and often incisely serrate, on both sides sparingly hairy, middle lft. rhombic-ovate or ovate, sometimes 3-lobed, subcordate, 3–7 cm. long, lateral lfts. nearly sessile, often 2-lobed; petioles pubescent, prickly; stipules dilated below the middle, lanceolate or linear-lanceolate above; fls. white, 3 cm. across, in few-fld. pubescent glandular and prickly corymbs; calyx pubescent often glandular; sepals ovate-lanceolate; petals broad-elliptic: fr. of few large drupelets, black, bloomy. Fl.vii–viii; fr.ix. S.E.3:t.456(c). F.D.t.2576(c). Sudre, Rub. Eur. t.207. Throughout Eu., in N. Asia to Altai Mts.—Var. **turkestànicus** Reg. Young stems slightly pruinose: terminal lft. often 3-fid: petals narrow-oblong: fr. oblong-cylindric, with numerous drupelets. Gt.41: 107. Turkest. Cult. 1890.

A related species or hybrid is **R. nemoròsus** Hayne. Stems slender, often to 8 m. long, pruinose, below rather thickly beset with small somewhat curved prickles: lfts. usually broad-ovate, irregularly serrate, bronzy in autumn, pubescent beneath: fls. small, corymbose; calyx grayish tomentose. F.D.25:t.2577(c). Hayne, Arzneygew.3:t.10(c). B.C.5:3506. Eu. Intr. ? Zone V.—Sometimes planted as ground cover.

35. **POTENTÍLLA** L. Cinquefoil. Herbs or small deciduous shrubs; buds with few scales: lvs. compound; stipules adnate to the petiole and sheathing: fls. in terminal cymes or solitary, white, yellow or red; sepals 5 with 5 alternate bracts at base; petals usually orbicular; stamens 10–30; pistils many, on a low conical receptacle, becoming small dry achenes; style deciduous. (Latin *potens*, powerful; referring to the medicinal properties of some species.) More than 300 species throughout the n. temperate and frigid zones; few of them woody.

A. Lfts. entire: styles short, thickened upwards: much branched shrub.....1. *P. fruticosa*
AA. Lfts. serrate; styles slenderer, not thickened: sparingly branched, suffruticose. 2. *P. Salesoviana*

1. **P. fruticòsa** L. Low shrub, to 1.5 m.; bark shreddy: lvs. pinnate; lfts. 3–7, usually 5, sessile, elliptic to linear-oblong, acute, 1–2.5 cm. long, with revolute margin, more or less silky: fls. usually bright yellow, 2–3 cm. across, solitary or few on slender stalks; sepals triangular-ovate, bracts usually linear. Fl.v–viii. N.K.7:t.35. S.E.3:t.436(c). B.B.2:262. (*Dasiphora f.* Raf., *P. Moyesii* Hort.) N. hemisphere. Cult. 1700. Zone I.—Handsome low rather dense shrub with conspicuous yellow or white fls. in early summer and sparingly until Sept. Very variable.—*Vars. with bright yellow fls.*: Var. **grandiflòra** Willd. Upright: lvs. larger, green, slightly pubescent: fls. 3–3.5 cm. across.—Var. **micrándra** Schneid. Of lower spreading habit: lvs. rather broad: fls. rather small; stamens shorter than pistils. S.H.1:f.313i-l. (*P. m.* Koehne.) Intr. before 1890.—Var. **tenuifòlia** Lehm. Lfts. narrow, often nearly linear, more pubescent.—Var. **pyrenáica** Willd. Dwarf alpine form of dense habit; lfts. small, lanceolate. (*P. prostrata* Lap.)—Var. **parvifòlia** Wolf. Dwarf: lfts. usually 7, elliptic-oblong, 3–8 mm. long, glabrescent; fls. sometimes pale yellow. S.H.1:f.313n(l). (*P. p.* Fisch., *P. Farreri* Hort., ?var. *humilis* Reg.) C. Asia.—Var. **pùmila** Hook. f. Dwarf: lfts. small, densely silky-pubescent. (*P. lanuginosa* Hort. Vilm.) Intr. before 1910. C. Asia.—Var. **álbicans** Rehd. & Wils. Lfts. elliptic-oblong, pubescent and dull green above, white-tomentose beneath. W. China. Intr. 1909. Very handsome form.—*Vars. with pale yellow or creamy white fls.*: Var. **Friedrichsènii** Rehd. Lfts. rather large, pubescent, glaucous beneath: fls. light yellow. (*P. F.*

Spaeth.) Hybrid between the type and var. *dahurica*. Orig. 1895.—Var. **ochroleûca** Bean. Lfts. nearly green beneath: fls. creamy white: seedling of the preceding var. (*P. Friedrichsenii* var. *o.* Spaeth.) Orig. before 1909.—Var. **Purdómii** Rehd. Lfts. 7–10 mm. long, glaucous and nearly glabrous beneath: fls. pale yellow. N. China. Intr. 1911.—Var. **Vilmoriniàna** Kom. Lfts. pubescent above, white-tomentose beneath: fls. creamy-white. R.H. 1910:57. W. China. Intr. 1905.—*Vars. with pure white fls.*: Var. **Veìtchii** Bean. Shrub to 1.5 m. Lfts. pubescent, glaucous beneath, 1–2 cm. long: fls. with the calyx-bracts broader than the sepals. B.M.8637(c). B.S.2:222. S.L.302(h). J.L.40:222(h). (*P. V.* Wils., *P. davurica* var. *V.* Jesson.) C. and W. China. Intr. 1902. Very handsome.—Var. **leucántha** Bean. Lfts. pubescent: fls. with narrow calyx-bracts: seedling of var. *Friedrichsenii*. (*P. Friedrichsenii* var. *l.* Spaeth.) Orig. before 1910.—Var. **dahùrica** Ser. Dwarf compact shrub, less than 0.5 m. high: lfts. about 1 cm. long, nearly glabrous, glaucous beneath; the lustrous brown stipules with a conspicuous tuft of hairs at apex: fls. usually solitary, 2–3 cm. across, with broad calyx-bracts. L.B.914(c). S.L.42(h). (*P. davurica* Nestl.) N. China, Siber. Intr. 1822.—Var. **mandshùrica** Maxim. Low shrub: lfts. small, densely whitish silky-pubescent on both sides. G.C.III.76:233. M.G.32:233, 234(h). (*P. davurica* var. *m.* Th. Wolf, *P. f.* var. *leucantha* Mak.) Manch. Cult. 1911.

2. **P. Salesoviàna** Steph. Suffruticose, 0.5–1 m. tall, little branched; stipules large, broadly scarious: lfts. 7–9, rarely 5, short-stalked, oblong, 2–3.5 cm. long, coarsely serrate, glabrous and dark green above, white-tomentose beneath: fls. white, rosy-tinted, 3 cm. across, in 3–7-fld. cymes; sepals lanceolate, as long as petals; bracts linear, half as long. Fl.VI–VIII. B.M.7558(c). (*Comarum Salessowii* Bge.) Siberia. Intr. 1823.

The closely related **P. palústris** Scop. with smaller purple fls. can hardly be considered suffruticose.

36. **FALLÙGIA** Endl. Deciduous shrub: lvs. alternate, partly fascicled, 3–7-lobed, petioled, stipulate: fls. terminal, perfect or polygamous, white; calyx-tube cupular; sepals 5, ovate, imbricate, with 5 alternate, narrow bracts at base; petals 5, suborbicular, spreading; stamens numerous; pistils many on a conical torus, pubescent; style slender; achenes with long persistent plumose style. (After Virgilio Fallugi or Falugi, an Italian botanical writer, end of XVIIth century.) One species in sw. N. Am.

F. paradóxa Endl. Upright shrub to 1.5 m.; brts. slender, grayish white-tomentulose: lvs. cuneate, with 3–7 narrow-oblong lobes decurrent into the linear petiole, 8–15 mm. long, revolute, white-tomentulose beneath: fls. 1–3, 2.5–3.5 cm. across; achenes with feathery tails, 2.5–3.5 cm. long. Fl.VI–VIII. B.M.6660(c). E.N.III.3:37. M.G.15:207(h,fl). S.L.206(h,fl). S. Nev. and Utah to n. Mex. Intr. 1877. Zone (V) VI.—Slender shrub with conspicuous white fls. and attractive heads of feathery tailed fr.; demands sunny position and well drained soil.

37. **COWÀNIA** Don. Evergreen shrub: lvs. alternate and partly fascicled, lobed or dentate, petioled, stipulate: fls. terminal on short brts., often polygamous, white or purple; calyx-tube cup-shaped; sepals 5; petals 5, spreading; stamens numerous; pistils 1–12; achenes with persistent plumose style. (After James Cowan, English merchant who intr. many Peruvian and Mexican plants.) About 4 species in the S. W. States and Mex.

C. Stansburiàna Torr. Much-branched shrub to 2 m., with rather short stiff pubescent brs.: lvs. 3–5-lobed, with short oblong often cleft or toothed

lobes, 6–15 mm. long, with revolute margin, dark green and glandular above, white-tomentulose beneath: fls. sulphur-yellow to white, about 2 cm. across; pedicels 2–8 mm. long, stipitate-glandular; calyx-tube turbinate; achenes usually 2, 4–5 cm. long. Fl.VII–IX. Trans. Linn. Soc. 14:t.22. E.N.III.3:37. (*C. mexicana* Gray, not D. Don.) Nev. and s. Colo. to s. Calif. and n. Mex. Cult. 1904. Zone (V).—Handsome aromatic shrub with conspicuous fragrant white fls. and feathery fr.; demands sunny position and well drained soil.

38. **DRÝAS** L. MOUNTAIN AVENS. Evergreen prostrate, suffruticose plants: lvs. alternate, dentate or entire; stipules adnate to petiole: fls. solitary, slender-pediceled, white or yellowish white; calyx-tube cup-shaped; sepals 8–10, persistent; petals 8–10, oval or obovate; stamens many; pistils many, on a flat torus: achenes with persistent plumose style. (Greek, wood-nymph.) Three species in the n. hemisphere on high mountains and in arctic regions.—Tufted creeping plants with showy white fls. from June to August and feathery fr.; suited for rockeries.

A. Lvs. usually subcordate at base: fls. white; stamens shorter or as long as sepals. 1. *D. octopetala*

AA. Lvs. usually cuneate at base: fls. yellowish; stamens longer than sepals. 2. *D. Drummondii*

1. **D. octopétala** L. Lvs. elliptic to oblong, usually obtuse, deeply crenate, 1–2.5 cm. long, dark green and glabrous or slightly pubescent above, white-tomentose beneath; petioles 5–15 mm. long: fls. upright, 3–4 cm. across; pedicels 3–12 cm. long, pubescent; sepals linear to linear-lanceolate: achenes with style 2.5 cm. long. Fl.V–VII; fr.VII–X. B.B.2:273. Gt.9:t.286(c). S.E. 3:t.460(c). Gn.87:292. S.L.191(h). N. Am., Eu. and Asia, in Am. s. to Utah and Colo. Cult. 1750. Zone I.—Var. **asiàtica** Nakai. Lvs. broad-elliptic to elliptic. N.K.7:t.17. E. Asia. Intr.?—Var. **integrifòlia** Hook. f. Lvs. oblong to oblong-lanceolate, entire or with one or two teeth at base, revolute: fls. slightly smaller. H.E.3:220(c). B.B.2:274. (*D. i.* Vahl.) N. Eu., Arct. Am. Intr. 1824.—*D. lanata* Stein is scarcely different from *D. octopetala*.

D. o. × *Drummondii* = **D. Suendermánnii** Kellerer. Fls. slightly nodding, yellow in bud, finally white. Gn.M.38:25(h). Orig. before 1920.

2. **D. Drummóndii** Rich. Similar to the preceding: lvs. usually oblong, crenate-dentate, to 3 cm.; petioles longer: fls. nodding, campanulate; pedicels often longer, floccose-pubescent; sepals ovate to ovate-lanceolate, glandular-pubescent: achenes with style to 4 cm. long. B.M.2972(c). B.B.2:274. (*D. octopetala* var. *D.* S. Wats.) Arct. Am. s. to Mont. Cult. 1830.

D. tomentòsa Farr with obovate or elliptic lvs. tomentose on both sides and tomentose, not glandular sepals and yellow fls. from the Can. Rockies is probably not in cult.

39. **CERCOCÁRPUS** Kunth. MOUNTAIN-MAHOGANI. Evergreen or half-evergreen shrubs or small trees with hard and heavy wood; buds with several scales, pubescent: lvs. alternate, mostly fascicled, short-petioled, entire or dentate; stipules adnate to petiole, lanceolate, deciduous: fls. perfect, apetalous, small, greenish white or reddish, 1–10 in the axils of fascicled lvs.; calyx-tube cylindric, elongated, abruptly expanded into a cup-shaped 5-lobed deciduous limb, bearing 15–30 stamens with short filaments; ovary 1-celled, enclosed in the calyx-tube; style exserted: fr. a 1-seeded achene wholly or partly enclosed in the calyx-tube, with long plumose style. (Greek *kerkos*, tail and *karpos*, fruit; referring to the long plumose style of the fr.) About 20 species or perhaps less in w. N. Am. from Ore. to s. Mex.—Grown occasionally in collections; attractive in autumn with their feathery tailed fr.; they demand well-drained soil and sunny position. Fls. in spring and early summer.

A. Lvs. dentate, usually obovate, chartaceous.
B. Lvs. grayish or green beneath.
C. Lvs. glabrous above at maturity and glabrescent beneath.....1. *C. betuloides*
CC. Lvs. pubescent above and tomentulose beneath.....2. *C. montanus*
BB. Lvs. white-tomentose beneath.....3. *C. argenteus*
AA. Lvs. entire, lanceolate, coriaceous, revolute.....4. *C. ledifolius*

1. **C. betuloïdes** Nutt. Shrub or tree to 10 m.; bark scaly; brts. glabrous or nearly so; lvs. obovate, 1.5–5 cm. long, crenate-serrate above the middle and rounded at apex, sparingly hairy when young, dark green above, paler beneath, with 5–6 pairs of veins: calyx-tube silky-strigose, 8–10 mm. long, sepals obtuse; style in fr. 6–7 cm. long. Fl.v; fr.IX. H.I.322. B.T.f.369. S.H.1:f.318f. W.G.4:554, 555. (*C. betulifolius* Nutt., *C. parvifolius* var. *b.* Sarg.) C. and S. Calif. Intr. 1877? Zone VII?

2. **C. montànus** Raf. Shrub to 2 m.; bark persistent, fissured; brts. sparingly pilose when young: lvs. broad-obovate, 2–5 cm. long, rounded at apex, coarsely serrate with ovate teeth, pilose above, finely tomentulose and paler beneath, with 5–6 pairs of veins; petioles 3–6 mm. long: calyx-tube about 1 cm. long, pilose; sepals acute: style in fr. 6–8 cm. long. Fl.v–VI; fr.VIII–IX. B.B.2:274. Clements, Rocky Mtn. Flow. t.26,f.7. S.L.142(h). (*C. parvifolius* Nutt.) Mont. and S. Dak. to Utah, N. Mex. and Kans. Cult. 1913. Zone V.

A closely related species is **C. Douglàsii** Rydb. Tree to 5 m.: lvs. oblong-obovate, dentate above the middle, with very short teeth, at maturity glabrate above, grayish tomentose beneath; petiole 5–10 mm. long: calyx-tube villous-tomentose. H.I.323. S.S.4:t.166. S.H.1:f.316a-e,318d-e(as *C. betulaefolius*). (*C. parvifolius* Nutt., in part.) S. Ore. to Calif. Intr. 1872. Zone VI?

3. **C. argénteus** Rydb. Shrub to 3 m.; young brts. white-villous: lvs. obovate to oblanceolate, 2–4 cm. long, crenate-dentate from the middle, with obtuse teeth, pilose above, white-tomentose beneath, with 4–5 pairs of veins; petioles 2–5 mm. long; calyx-tube silky: style in fr. 6–7 cm. long. Fl.v; fr. VIII. Colo., N. Mex., and Tex. Intr. 1916. Zone VI?

4. **C. ledifolius** Nutt. Tree to 12 m., with furrowed bark; brts. pubescent at first: lvs. narrow-lanceolate to elliptic-lanceolate, 1–3 cm. long, lustrous and glabrate above at maturity, resinous and tomentulose beneath, with obscure veins; petioles 3–5 mm. long: calyx-tube white-villous; sepals acute, tomentose on both sides: style in fr. 5–7 cm. long. Fl.v–VI; fr.VIII. H.I.324. S.S.4:t.165. N.S.2:t.51(c). Wash. and Mont. to Calif. and Ariz. Intr. about 1879.

40. **PÚRSHIA** DC. Deciduous shrub; buds small, scaly: lvs. alternate, partly fascicled, cuneate, 3-lobed; stipules small: fls. perfect, yellowish, solitary and subsessile at end of short brts.; calyx-tube tubular; sepals 5, elliptic to oblong; petals 5, spatulate; stamens about 25; pistil 1, rarely 2; style short, persistent: fr. a pubescent fusiform achene, exceeding the persistent calyx. (After F. T. Pursh or Pursch; 1774–1820; born in Germany; traveled in N. Am. and wrote Flora Americae septentrionalis.) Syn.: *Kunzia* Spreng. One species.

P. tridentàta DC. Spreading shrub to 3 m.; young brts. pubescent: lvs. obovate, gradually narrowed at base, 5–30 mm. long, 3-lobed at apex with obtuse lobes, revolute, slightly pubescent or glabrate above, whitish tomentulose beneath: fls. 8 mm. across; calyx villous and glandular: fr. about 1 cm. long, pubescent. Fl.v; fr.VIII. B.R.1446(c). Hooker, Fl. Bor. Am. t.58. S.H.1:f.315l-p,f.317a. S.L.319(h). Ore. and Calif. to Wyo. and N. Mex. Intr. 1826. Zone V.—Var. **glandulòsa** Jones with smaller glandular lvs. glabrous above is probably not in cult. and certainly tenderer.—Interesting shrub of no particular ornamental qualities.

Here may be mentioned **Coleógyne** Torr. of doubtful affinity, but usually placed near Purshia, though very distinct from it and all related genera on account of the opposite lvs. and brts. and the urceolate disk enclosing the carpel and most of the twisted style. **C. ramosíssima** Torr. is a small spinescent shrub: lvs. crowded, linear-clavate, 5–15 mm. long, with 4 grooves beneath: fls. solitary, apetalous, with 4 sepals and many stamens. Torrey, Pl. Fremont.t.4. S.H.1:f.316p-v. S. Colo. to Ariz. and s. Calif. Intr. ? Zone VII?

41. **CHAMAEBÁTIA** Benth. Half-evergreen glandular-pubescent shrub: lvs. alternate, 3-pinnatifid, stipulate: fls. white, in terminal corymbs; calyx-tube broad-campanulate; sepals lanceolate; petals 5, obovate; stamens numerous; pistil 1, with short style and decurrent stigma: fr. a small obovoid achene, enclosed by the persistent calyx. (Greek *chamaibatos*, a kind of bramble; alluding to the bramble-like fls.) Two species in Calif. and L. Calif.

C. foliolòsa Benth. Shrub to 1 m.: lvs. nearly sessile, oval or ovate-oblong in outline 3–7 cm. long, closely 3-pinnately dissected, ultimate segments 0.5–1 mm. long, villous and glandular: fls. 1.5–2 cm. across, in 4–8-fld. corymbs; pedicels 5–20 mm. long. Fl.VII. B.M.5171(c). E.N.III.3:f.18e-g. S.H.1:f.317g-n. Gn.3:27. Calif. Cult. 1860. Zone VII?—Attractive shrub with finely divided aromatic foliage and white fls. appearing in summer; suited for sunny rockeries.

42. **MARGYRICÁRPUS** Ruiz & Pav. Evergreen low shrubs: lvs. odd-pinnate with persistent spinescent rachis; stipules adnate to base of petiole, sheathing: fls. perfect, apetalous, 1–3 axillary, sessile, subtended by several bract-like lf.-bases; receptacle tubular, 4-ribbed and with a short spine under each of the 4 calyx-lobes; stamens 1–3; carpel 1 with 1 pendulous ovule; stigma penicillate: fr. berry-like or an angled or winged achene. (Greek *margaros*, pearl, and *karpos*, fruit; referring to the white berry-like fr.) Including *Tetraglochin* Poepp. About 6 species in the Andes from Ecuador to Patagonia.

M. setòsus Ruiz & Pav. PEARL-FRUIT. Prostrate shrub to 30 cm. high, with ascending or upright yellow to brownish brs. partly covered by the sheathing bases of the petiole: lvs. 1.5–2 cm. long; lfts. 11–17, narrow-linear, revolute at the margin, glabrous except sparingly pilose at apex and on rachis: fls. solitary, inconspicuous: fr. a white berry, 4–5 mm. across, of acid flavor. Ruiz & Pav., Fl. Peruv. t.8. S.H.1:f.318n-q^1. Ecuador to Patagonia. Cult. 1875. Zone VII?—Interesting little shrub attractive in fr.; suited for the rock garden where it demands a well drained sunny position.

A related genus is **Acaèna** L. differing chiefly in the fr. being furnished with hooked spines and in the capitate or spicate infl. About 40 species in Am. and N. Zealand, mostly herbaceous or suffruticose.—A shrubby species is **A. elongàta** L. Low upright or prostrate shrub: lvs. 2–6 cm. long; lfts. 9–15, obovate to oblong, 1-1.5 cm. long, crenate, glabrous above, pubescent on midrib beneath; petiole with sheathing base:: fls. greenish, small, in axillary peduncled racemes: fr. 7–8 mm. long, usually pubescent between the hooked spines. Mex. to Peru.—Var. **grácilis** Bitter. Lfts. smaller, oblong: racemes usually 7-fld.: fr. glabrescent. S.L. 79(h). Mex. Cult. 1912. Zone VIII?—The other species in cult. are scarcely woody. The best known is **A. microphýlla** Hook. f. Prostrate plant forming large patches: lfts. 7–11, suborbicular, 3–7 mm. long, dentate: fls. in globose stalked heads: fr. with red spines. N.I.1:7. N. Zeal. Cult. 1875. Zone VII?

43. **POTÈRIUM** L. Deciduous low shrub with branched spines: lvs. odd-pinnate, small, with adnate stipules: fls. monoecious, apetalous, greenish, small, in peduncled terminal spikes with pistillate fls. below and staminate above; sepals 4, rarely 3; stamens many; carpels 2, with brush-like stigmas:

fr. enclosed in the fleshy globose calyx-tube. (Ancient Greek plant name, also drinking-cup in Greek.) One species.

P. spinôsum L. Divaricate rigid shrub, to 0.3 m. high: lfts. 7–15, broad-oval, toothed at apex, 1–4 mm. long, pubescent, tomentose beneath: spikes 1.5–2.5 cm. long: fr. red, globose, 3–4 mm. across. Fl.IV–V. S.F.10:t.942(c). S.H.1:f.318u-x[1]. (*Sanguisorba spinosa* Bert.) Cult. 1905. Zone VII?

44. **RÔSA** L. Rose. Deciduous or sometimes evergreen shrubs, with upright, climbing or trailing stems, usually prickly, rarely unarmed; lvs. alternate, odd-pinnate, rarely simple, stipulate: fls. solitary or corymbose, at the end of short brts.; sepals and petals 5, rarely 4; stamens numerous; pistils numerous, enclosed in an urn-shaped receptacle (hip) which becomes fleshy and berry-like at maturity, enclosing several or many bony achenes. (Rŏsa, its ancient Latin name.) One hundred to 200 species throughout the temp. and subtrop. regions of the n. hemisphere; in N. Am. to n. Mex., in Afr. to Abyssinia, in Asia to the Himal. and Philippine Isls.

The species of this genus are very variable and hybridize easily and the conception of the species varies greatly according to the views of different botanists. While Bentham & Hooker recognized only about 30 species, Gandoger enumerates from Europe and W. Asia alone 4266 species. There is no recent monograph; Crépin's Primitiae monographiae Rosarum (1869–82) is the most important general treatment; for American Roses see Rydberg in N. Am. Fl. XXII:483–533 (1918); for the Roses of Europe see Keller in Ascherson & Graebner, Syn. Mitteleur. Fl.VI.pt.1,32–384(1900–2). For cult. Roses see Thory & Redouté, Les Roses (1817–20) with 160 colored plates and Ellen Willmott's The Genus Rosa (1910–14). Within the limited space of this book it has not been possible to describe all the spontaneous species which could be grown within our area nor to delve deeply into the numerous horticultural forms.—The Rose has been one of the most favorite flowers, if not the most favorite of all ages, at least in the Occidental World, though it is perhaps not quite as popular in this country as in Europe. The economic products of Roses are few, attar of Rose being perhaps the most important; the hips of some large-fruited species are sometimes used for culinary purposes.

Lvs. simple, without stipules: fls. yellow. Subgen. I. HULTHEMIA
Sect. 1. Simplicifoliae
Subgen. II. EUROSA

Lvs. pinnate, stipulate.

A. Styles much exserted beyond the mouth of the receptacle; stipules adnate.
B. Styles united into a column, usually almost as long as stamens.....Sect. 2. Synstylae
BB. Styles free, about half as long as stamens; lfts. usually 3–5.....Sect. 6. Indicae
AA. Styles little or not exserted, forming a head closing the mouth of the receptacle (slightly exserted in *R. stylosa*, *R. Davidii*, *R. corymbulosa*, *R. multibracteata*, *R. omeiensis*).
B. Stipules free or adnate only at base, small; sarmentose or climbing shrubs: fls. white or yellow.
C. Brts. glabrous: lfts. 3–5.
D. Pedicels and receptacle smooth; stipules subulate, caducous: fls. small, umbellate, yellow or white.....Sect. 3. Banksianae
DD. Pedicels and receptacle bristly: stipules denticulate: fls. solitary, large, white. Sect. 5. Laevigatae
CC. Brts. tomentose or pubescent: lfts. 7–9; stipules pectinate: fls. one or few, with large bracts at base of the short pedicel.....Sect. 4. Bracteatae
BB. Stipules adnate more than ½ of their length: usually upright shrubs.
C. Receptacle smooth or hispid.
D. Lvs. of flowering brts. 3–5-foliolate, large and firm: sepals reflexed after flowering, caducous, usually pinnate: stems usually with prickles and bristles. Sect. 7. Gallicanae
DD. Lvs. of flowering brts. 5–11-foliolate (if 3-foliolate fls. short-stalked with smooth receptacle).
E. Fls. usually corymbose, if solitary pedicels with one or more bracts: upper stipules usually dilated.
F. Stems with usually only one kind of prickles, sometimes mixed with glandular bristles; prickles usually hooked, stout, scattered; outer sepals usually pinnate.....Sect. 8. Caninae
FF. Stem at least at base with usually straight, often slender, prickles and numerous bristles gradually passing into prickles: infrastipular prickles present: sepals usually entire.
G. Sepals after flowering spreading, deciduous: achenes inserted only on the bottom of receptacle: infl. usually glandular-hispid....Sect. 9. Carolinae

GG. Sepals after flowering upright, usually persistent: achenes inserted on wall and on bottom: prickles sometimes lacking ..... Sect. 10. CINNAMOMEAE
EE. Fls. usually solitary, without bracts, only exceptionally corymbose; sepals persistent; lfts. small: stipules narrow with usually spreading dilated auricle.
F. Petals 5; styles not exserted: prickles scattered.
G. Lfts. usually 9 on flowering brts.; sepals entire; fls. white, pink or yellow: prickles straight, usually slender and mixed with bristles.
Sect. 11. PIMPINELLIFOLIAE
GG. Lfts. 5–7 on flowering brts.: outer sepals pinnate, rarely entire: fls. yellow: prickles usually hooked, rather stout: sepals spreading or reflexed.
Sect. 12. LUTEAE
FF. Petals 4, only occasionally 5, white; styles somewhat exserted: infrastipular prickles present: lfts. 7–17; sepals upright ..... Sect. 13. SERICEAE
CC. Receptacle prickly: lfts. small, not exceeding 2.5 cm.
D. Lfts. 3–7 on flowering brts., cuneate-obovate, incisely dentate.
Sect. 14. MINUTIFOLIAE
DD. Lfts. 7–15 on flowering brts., elliptic to elliptic-oblong, sharply serrate.
Sect. 15. MICROPHYLLAE

Sect. 1. SIMPLICIFOLIAE. 1. *R. persica*

Sect. 2. SYNSTYLAE

Stipules pectinate; prickles usually infrastipular; styles glabrous.
2. *R. multiflora*

Stipules entire or denticulate: prickles scattered.
A. Habit upright, usually with arching brs.
B. Lfts. 3–5 on flowering brts., pubescent at least on veins beneath.
C. Fls. small, about 1 cm. across: lfts. linear-lanceolate ..... 3. *R. Watsoniana*
CC. Fls. about 5 cm. across: lfts. usually ovate-oblong ..... 4. *R. setigera*
BB. Lfts. 5–9 on flowering brts.
C. Lfts. acute or acuminate, 3–10 cm. long; stems often sarmentose.
D. Lfts. pubescent, at least beneath.
E. Fr. ovoid, 1.5 cm. long; corymb umbel-like: lfts. usually 7–9, pubescent chiefly on the veins ..... 5. *R. Helenae*
EE. Fr. subglobose, about 1 cm. long: corymb not umbel-like: lfts. 5–7, pubescent beneath all over.
F. Lfts. usually 5, glabrous above, sharply and coarsely serrate: brts. glabrous.
6. *R. Rubus*
FF. Lfts. usually 7, pubescent above: brts. often puberulous ..... 7. *R. Brunonii*
DD. Lfts. glabrous or nearly so.
E. Lfts. 5–7, green beneath.
F. Styles pubescent: fl.-buds gradually acuminate ..... 8. *R. moschata*
FF. Styles glabrous; fl.-buds abruptly acuminate ..... *R. Maximowicziana*
EE. Lfts. usually 5, glaucescent beneath ..... 10. *R. Gentiliana*
CC. Lfts. obtuse or acutish, 1–2.5 cm. long, glaucescent: upright shrub .. 11. *R. Soulieana*
AA. Habit trailing or prostrate.
B. Lvs. evergreen or half-evergreen, lustrous on both sides: fls. usually several.
C. Lfts. usually 9, obtuse, 8–20 mm. long; stipules dentate ..... 12. *R. Wichuraiana*
CC. Lfts. usually 5, acuminate, 2–5 cm. long; stipules entire ..... 13. *R. sempervirens*
BB. Lvs. deciduous, glaucescent beneath; lfts. usually 7: fls. often solitary ... 14. *R. arvensis*

Sect. 3. BANKSIANAE
15. *R. Banksiae*

Sect. 4. BRACTEATAE
16. *R. bracteata*

Sect. 5. LAEVIGATAE
17. *R. laevigata*

Sect. 6. INDICAE

Stems with uniform prickles: lvs. glabrous.
A. Lvs. persistent or semipersistent.
B. Fls. white, yellowish or light pink, very fragrant; sepals usually entire: fr. globose or depressed-globose; stipules without or with few marginal glands at the auricles.
18. *R. odorata*
BB. Fls. red or pink, rarely whitish, not or slightly fragrant; sepals usually pinnate: fr. ovoid or pyriform: stipules glandular-ciliate ..... 19. *R. chinensis*
AA. Lvs. deciduous: fls. many in a corymb ..... 20. *R. Noisettiana*

Stems with prickles and bristles: lvs. slightly pubescent beneath: fls. solitary or few.
21. *R. borboniana*

Sect. 7. GALLICANAE

Prickles very unequal: lfts. usually doubly glandular-serrate.
A. Lfts. firm, leathery: pedicels upright ..... 22. *R. gallica*
AA. Lfts. thin, sometimes simply serrate: pedicels nodding ..... 23. *R. centifolia*

Prickles uniform: lfts. simply serrate, not glandular.
A. Receptacle glandular-hispid: lfts. ovate-oblong, often pubescent beneath. 24. *R. damascena*
AA. Receptacle usually glabrous: lfts. broad-ovate or broad-elliptic, pubescent beneath.
25. *R. alba*

Sect. 8. Caninae

Lfts. more or less glandular beneath or often doubly serrate with gland-tipped teeth.
A. Prickles slender, straight or slightly curved: lfts. tomentose.
B. Sepals upright, persistent: fr. large, about 2 cm. across: auricles incurved, falcate. 26. *R. villosa*
BB. Sepals finally deciduous: fr. smaller: auricles short, divergent.....27. *R. tomentosa*
AA. Prickles hooked: lfts. glabrous or pubescent beneath.
B. Lfts. suborbicular or broad-oval, usually obtuse, glandular on both sides: styles pubescent: sepals long-persistent.....28. *R. eglanteria*
BB. Lfts. ovate or oval, acute or short-acuminate, eglandular above; styles glabrous or nearly so; sepals soon deciduous.....29. *R. micrantha*

Lfts. not glandular except sometimes on midrib; teeth usually simple.
A. Style exserted: sepals reflexed, deciduous.....30. *R. stylosa*
AA. Styles not or little exserted.
B. Lfts. pubescent, at least beneath.....31. *R. dumetorum*
BB. Lfts. glabrous.
C. Lfts. bright or dark green, lustrous above.....32. *R. canina*
CC. Lfts. bluish green, tinged with red, dull above, simply serrate, 7–9: brts. bloomy, with few prickles.....33. *R. rubrifolia*

Sect. 9. Carolinae

A. Stipules more or less convolute, at least on the shoots; prickles hooked: lfts. serrulate. 34. *R. palustris*
AA. Stipules flat: lfts. rather coarsely serrate.
B. Lfts. 5–7.
C. Lfts. pubescent beneath.....36. *R. Lyonii*
CC. Lfts. glabrous or slightly pubescent on veins beneath.....37. *R. carolina*
BB. Lfts. 7–11.
C. Infrastipular prickles usually curved: lfts. 7–9, usually elliptic....35. *R. virginiana*
CC. Infrastipular prickles straight, slender: lfts. 7–11, elliptic-oblong to narrow-oblong.
D. Brts. densely bristly: pedicels 1–3 cm. long.....38. *R. nitida*
DD. Brts. not bristly: pedicels 5–10 mm. long.....39. *R. foliolosa*

Sect. 10. Cinnamomeae

Infrastipular prickles not present
A. Brts. and prickles tomentose: lfts. thick, rugose above.....40. *R. rugosa*
AA. Brts. and prickles glabrous.
B. Brts. and stems bristly.
C. Fls. solitary or few: lfts. 3–7, rarely 9.....41. *R. acicularis*
CC. Fls. corymbose: lfts. 7–11: low plants.
D. Lfts. glabrous, acute.....42. *R. arkansana*
DD. Lfts. pubescent at least beneath, usually obtuse.....43. *R. suffulta*
BB. Brts. and stems unarmed or the latter with weak bristles when young.
C. Lfts. simply serrate, 5–7: fr. subglobose.....44. *R. blanda*
CC. Lfts. doubly serrate, 7–9: fr. usually oblong to ovoid.....45. *R. pendulina*

Infrastipular prickles present
A. Stipules at least on shoots more or less convolute; prickles curved....46. *R. cinnamomea*
AA. Stipules flat.
B. Sepals persistent.
C. Lfts. 3–7: brts. prickly, not bristly.
D. Styles not exserted.
E. Fls. usually several, less than 5 cm. across.
F. Prickles straight or nearly so.
G. Lfts. puberulous beneath, bright green.....47. *R. pisocarpa*
GG. Lfts. glabrous, bluish green.....48. *R. Woodsii*
FF. Prickles curved: lfts. doubly serrate, villous beneath.....49. *R. californica*
EE. Fls. solitary, 5–6 cm. across: lfts. doubly glandular-serrate.....50. *R. nutkana*
DD. Styles exserted; infl. subumbellate: lfts. doubly serrate.....51. *R. corymbulosa*
CC. Lfts. 7–13 (5–9 in *R. persetosa*, see under No. 54).
D. Fls. corymbose.
E. Brts. and stems only with prickles or unarmed.
F. Style exserted.
G. Lfts. obtuse, 6–15 mm. long.....60. *R. multibracteata*
GG. Lfts. acute, 3–6 cm. long.....52. *R. Davidii*
FF. Style not exserted.....53. *R. caudata*
EE. Brts. and stems prickly and bristly.....54. *R. setipoda*
DD. Fls. solitary, rarely several, on short lateral brts.
E. Style not exserted.
F. Lfts. pubescent beneath, at least on the midrib (see also *R. Fedtchenkoana* under No. 58).
G. Brts. with prickles and bristles, lfts. usually doubly serrate, 3–5 cm. long. 55. *R. Sweginzowii*
GG. Brts. only with prickles: lfts. simply serrate, 1–3 cm. long. .56. *R. Moyesii*
FF. Lfts. glabrous, 8–20 mm. long.
G. Lfts. acutish, elliptic or ovate, 1.5–2.5 cm. long.....57. *R. bella*
GG. Lfts. obtuse, orbicular to oblong, 6–20 mm. long.

H. Lfts. serrate above the middle: pedicels short.....58. *R. Webbiana*
HH. Lfts. sharply serrate from below the middle: pedicels 1.5–3 cm. long. 59. *R. sertata*
EE. Styles exserted, nearly as long as stamens: lfts. obtuse, 8–15 mm. long. 60. *R. multibracteata*
BB. Sepals deciduous, falling off as a whole, together with their base: fls. solitary: lfts. 5–9, 8–25 mm. long.
C. Stems without bristles: lfts. simply serrate.....61. *R. Willmottiana*
CC. Stems bristly and prickly.
D. Prickles straight: lfts. glabrous, doubly serrate.....62. *R. gymnocarpa*
DD. Prickles hooked: lfts. pubescent beneath, simply serrate.....63. *R. Beggeriana*

Sect. 11. PIMPINELLIFOLIAE

A. Flowering brts. prickly and bristly: fr. black: fls. white to pink, rarely yellow. 64. *R. spinosissima*
AA. Flowering brts. without bristles: fr. scarlet: fls. yellow.
B. Lfts. eglandular, simply serrate.
C. Shoots at least at base bristly: lfts. glabrous, rather sharply serrate..65. *R. Hugonis*
CC. Shoots never bristly: lfts. villous when young, crenate-serrate.....66. *R. xanthina*
BB. Lfts. with glandular dots beneath, slightly doubly glandular-serrate, aromatic. 67. *R. Ecae*

Sect. 12. LUTEAE

A. Prickles hooked: lfts. simply serrate, bluish green.....68. *R. hemispherica*
AA. Prickles straight: lfts. doubly glandular-serrate.....69. *R. foetida*

Sect. 13. SERICEAE

70. *R. omeiensis*

Sect. 14. MINUTIFOLIAE

71. *R. stellata*

Sect. 15. MICROPHYLLAE

72. *R. Roxburghii*

Subgen. HULTHEMIA Focke.

Sect. 1. SIMPLICIFOLIAE Lindl. Lvs. simple, estipulate: fls. yellow.

1. **R. pérsica** Michx. Low shrub, to 0.5 m., with slender yellowish brown prickly brs: lvs. short-petioled, elliptic to oblong, acute at ends, 1.5–3 cm. long, serrate, bluish green, finely pubescent: fls. solitary, yellow with purple eye, about 2.5 cm. across: fr. globose, prickly. Fl.v–viii. B.M.7096(c). B.R.1261(c). W.R.1(c). G.C.III.6:8,9,78. (*R. simplicifolia* Salisb., *R. berberifolia* Pall., *Lowea b.* Lindl.) Persia, Afghan. to Song. Intr. 1790. Zone VII?—A very distinct and remarkable species, but difficult to grow.

R. p. × *clinophylla* = **R. Hardii** Cels. Lfts. 1–7, oblong-obovate, glabrous, stipulate: fls. 5 cm. across, pale yellow, with orange eye: calyx-tube pubescent, with few prickles. W.R.7,t(c). P.M.10:t.195(c). G.C.II.24:469. Gn.19:473. Orig. before 1836.

Subgen. EUROSA Focke.

Sect. 2. SYNSTYLAE DC. Stems climbing, trailing or sarmentose, rarely upright, with hooked prickles: fls. in corymbs, outer sepals pinnate, rarely entire, caducous; style connate into a slender exserted column.

2. **R. multiflòra** Thunb. Vigorous shrub with long reclining or climbing brs.: lfts. usually 9, obovate to oblong, 1.5–3 cm. long, acute or obtuse, serrate, pubescent: fls. in many-fld. pyramidal corymbs, 1.5–2 cm. across, usually white; sepals ovate, abruptly acuminate; styles glabrous: fr. small, globular. Fl.vi–vii. B.M.7119(c). G.F.3:405;4:535(h). Gt.67:185(h). Gg.5:120(h), 121. (*R. polyantha* Sieb. & Zucc., *R. intermedia* Carr., *R. Wichurae* Koch.) Japan, Korea. Intr. before 1868. Zone V.—Var. **Thunbergiàna** Thory is the typical form with small white fls. described above.—Var. **cathayênsis** Rehd. & Wils. Fls. pink, 2–3 cm. across, in few- to many-fld., rather flat corymbs. Gn.89:35(h). (*R. c.* Bailey.) China. Intr. 1907. Zone V.—Var. **cârnea** Thory. A form of the preceding with double light pink fls. B.M.1059(c). B.R.425(c). (Var. *plena* Reg., *R. florida* Poir.) Intr. 1804.—Var. **platyphýlla** Thory. SEVEN SISTERS ROSE. Similar to the preceding, but lvs. larger and fls. deep pink. B.R.1372(c). Intr. 1817. Closely related to this form is well known "Crimson Rambler." A.G.16:233.

R. m. × *rugosa* = **R. iwàra** Sieb. with single, rather small white fls. W.R.193, t(c). (*R. yedoensis* Mak.)—*R. m.* × *chinensis*. Here belong the Polyantha Roses (*R. polyantha* Hort., not Sieb. & Zucc. nor Roessig.) Upright low shrubs with numerous, rather small double fls. Gn.29:118,t. R.H.1884:501(h). Also "Baby Rambler" (*R. m.* × *chinensis minima*) belongs here.—*R. m.* × *moschata*. Here probably belongs the Rose known as *R. polyantha grandiflora*. W.R.34,t(c).—*R. m.* × *borboniana* "Général Jacqueminot." Here belongs the "Dawson Rose" (*R. Dawsoniana* Hort., not Fllw. & Barry which is typical *R. multiflora*.) G.F. 6:316(h),317. G.W.7:125(h).—*R. multiflora* × *Wichuraiana* = *R. Barbierana;* see under No. 12.

3. **R. Watsoniàna** Crép. Shrub with sarmentose or recurving brs.: lfts. 3–5, linear-lanceolate, with entire wavy margin, 2.5–6 cm. long, pubescent beneath: fls. about 1 cm. across, white or pink in many-fld. pyramidal corymbs; style glabrous. Fl.VI. W.R.53,t.(c). G.F.3:477. R.B.14:183. (*R. multiflora* var. *W.* Matsum.) Cult. in Japan. Intr. 1870. Zone VI or VII.—Possibly a mutation of *R. multiflora;* peculiar rather than ornamental.

4. **R. setígera** Michx. PRAIRIE R. Shrub with glabrous climbing or recurving stems to 5 m. long: lfts. 3, rarely 5, ovate to oblong-ovate, 3–9 cm. long, short-acuminate, serrate, pubescent on the veins beneath: fls. about 5 cm. across, rose, fading to whitish, nearly scentless, in rather few-fld. corymbs; pedicels and receptacle glandular-hipid; styles glabrous: fr. globose, about 8 mm. across. Fl.VI–VIII. W.R.71,t.(c). Mn.8:t.5(c). G.F.10:323. Gng.1:325. C.L.A.4:339;7:473. S.L.366(h). Ont. to Neb., Tex. and Fla. Intr. 1800. Zone V.—Var. **tomentòsa** Torr. & Gr. Lvs. tomentose beneath, dull above: fls. smaller, more numerous. R.R.1:gr.5,3(c). L.A.2:f.516. (*R. rubifolia* Ait.)—There are several double-fld. forms as "Baltimore Belle" (B.C.5:f.3439) which are probably hybrids with *R. Noisettiana*, *R. gallica*, *R. multiflora* and others.

A related species is **R. anemoneflòra** Fort. Climbing; prickles few, small, recurved: lfts. 3, rarely 5, ovate-lanceolate, acuminate, glabrous, glaucous beneath; stipules narrow, dentate: fls. corymbose, small, white, double, the inner petals shorter and narrower than the outer ones; pedicels and calyx-tube glabrous. R.H.1842:281,t(c). W.R.67:t(c). E. China. Intr. 1844. Zone VII or VIII.

5. **R. Hélenae** Rehd. & Wils. Sarmentose shrub to 5 m., with stout hooked prickles: lfts. 7–9, rarely 5, oblong-ovate to ovate-lanceolate, 2.5–5 cm. long, short-acuminate, rounded or broad-cuneate at base, sharply serrate, grayish green beneath and pubescent on the veins: fls. white, fragrant, 3 cm. across, in many-fld. umbel-like corymbs 7–15 cm. across; pedicels slender, 2–3 cm. long, stipitate-glandular like the receptacle; sepals lanceolate, sparingly pinnate; styles pubescent: fr. ovoid or oblong-ovoid, 1–1.5 cm. long, scarlet. Fl.VI. J.L.47:195. Gn.89:35(h). Gs.6:108(h). C. China. Intr. 1907. Zone (V).

6. **R. Rùbus** Lév. & Van. Sarmentose shrub to 6 m., with small hooked prickles: lfts. usually 5, ovate-elliptic to obovate, 3–6 cm. long, abruptly acuminate, sharply or coarsely serrate, pubescent beneath, rarely nearly glabrous: fls. white, fragrant, 2.5–3 cm. across, in dense corymbs; pedicels 1–2 cm. long, glandular: fr. subglobose, about 8 mm. across, dark scarlet. Fl.VI. W.R.2:507,t. C. and W. China. Intr. 1907. Zone VI?

A related species is **R. glomeràta** Rehd. & Wils. Lfts. usually 5–7, oblong to oblong-obovate, 3–10 cm. long, serrulate, rugose above, reticulate beneath and pubescent on the veins: fr. orange-red. W. China. Intr. 1908. Zone VI?

7. **R. Brunònii** Lindl. HIMALAYAN MUSK-R. Tall shrub with arching or sarmentose brs., glabrous or thinly villous while young; prickles hooked, short and stout: lfts. 5–7, elliptic-oblong to oblong-lanceolate, 3–6 cm. long, acute or acuminate, serrulate, slightly pubescent or glabrous above, soft-pubescent beneath; petioles and rachis pubescent, usually with scattered

prickles: fls. white, 3–5 cm. across, fragrant, in many-fld. corymbs; sepals lanceolate, acuminate, much longer than the receptacle; pedicels slender, glandular-pubescent; styles pubescent: fr. ovoid, about 1 cm. long, glabrous. Fl.VI–VII. B.M.4030(c). B.R.829(c). W.R.37,t(c). G.C.III.36:152, 153. Gn.73:493;77:511;79:113(h),519(h);86:363(h; as *R. moschata*). (*R. moschata* var. *nepalensis* Lindl., *R. Brownii* Tratt.) Himal. Intr. 1822. Zone VII?—This species is usually cult. under the name *R. moschata*.

8. **R. moschàta** Herrm. Musk-R. Shrub with arching or sarmentose glabrous brs.; prickles straight or slightly curved; lfts. 5–7, elliptic-ovate to oblong-ovate, 2.5–5 cm. long, acute or acuminate, serrulate, glabrous or nearly so beneath, except pubescent on the midrib; petioles and rachis nearly glabrous, usually prickly: fls. white, 3–5 cm. across, in usually 7-fld. corymbs, of musky fragrance; pedicels slender, slightly pubescent and glandular; styles pubescent: fr. ovoid, small. Fl.VI. W.R.33.t(c). (*R. ruscinonensis* Déségl.) S. Eu., N. Afr., W. Asia. Long cult. Zone VII?—Var. **plèna** West. With double fls. R.R.1:99,t(c).—Var. **nastaràna** Christ. More robust: lfts. nearly glabrous beneath: fls. over 5 cm. across, tinged pinkish, more numerous. W.R.39,t.(c). R.H.1880:314, 315. (*R. Pissardii* Carr.) Persia. Intr. 1879. Zone VI?

R. m. × *gallica* = **R. Dupóntii** Déségl. Stems prickly and bristly: lfts. fewer and broader; fls. larger; styles shorter; pedicels glandular. B.R.861(c). W.R.43, t(c). Gn.67:254;77:510. Orig. before 1817.—Here belongs also *R. Freundiana* Graebn. Gt.57:471. G.25:311.

9. **R. Maximowicziàna** Regel. Shrub with sarmentose or arching brs.; young stems with scattered hooked prickles and bristles: lfts. 7–9, elliptic-ovate to oblong, 3–6 cm. long, acute or acuminate, finely serrate, paler beneath, glabrous; stipules glandular-serrulate: fls. white, 3–3.5 cm. across, in many-fld. corymbs with persistent bracts; sepals ovate, abruptly caudate-acuminate; pedicels stipitate-glandular or glabrous; styles glabrous: fr. subglobose or broad-ovoid, about 1 cm. across. Fl.VI–VII. N.K.7:t.1. (*R. Fauriei* Lév.) Manch., Korea. Intr.?—Var. **Jáckii** Rehd. Stems without bristles. N.K.7:t.3. (*R. J.* Rehd., *R. Kelleri* Bak., not Dalla Torre & Sarnth.) Korea. Intr. 1905. Zone V.

10. **R. Gentiliàna** Lév. Sarmentose shrub to 4 m., with hooked prickles: lfts. 5, elliptic to elliptic-ovate, 3–6 cm. long, abruptly acuminate, serrate, glabrous and glaucescent beneath; rachis glandular; stipules narrow, with small auricles: fls. white, fragrant, 2.5–3.5 cm. across, in umbel-like corymbs; pedicels 1.5–2 cm. long, like the receptacle glandular; styles pubescent; sepals glandular outside; fr. globose, 8 mm. across, dark red. Fl.VI–VII. B.M.8688(c). J.L.27:482. (*R. floribunda* Bak., *R. cerasocarpa* Rolfe, *R. moschata* var. *densa* Vilm.) C. China. Intr. 1907. Zone VI.

A closely related species is **R. filipes** Rehd. & Wils. Lfts. usually 5–7, oblong-ovate to lanceolate, 3.5–7 cm. long, acuminate, pale beneath and glabrous, but glandular: fr. globose, about 1 cm. across, scarlet. W. China. Intr. 1908. Zone (V).—Another related species is **R. phoenícea** Boiss. Lfts. usually 5, acute or obtuse; corymbs pyramidal, usually many-fld.; styles glabrous. Asia Minor. Intr. about 1885. Zone VI or VII.

11. **R. Soulieàna** Crép. Upright shrub to 4 m. with spreading brs.; prickles stout, hooked: lfts. usually 7, elliptic or obovate to ovate-oblong, 1–3 cm. long, acute or obtuse, serrulate, glabrous beneath: fls. white, 3–3.5 cm. across, in many-fld. corymbs 10–15 cm. across: pedicels and receptacle glandular; sepals ovate, acuminate: fr. ovoid, about 1 cm. long, orange-red. Fl.VI. B.M.8158(c). W.R.57,t(c). Gn.89:35(h). W. China. Intr. 1896. Zone VI.

12. **R. Wichuraiàna** Crép. Memorial R. Half-evergreen, with long prostrate or trailing brs.; prickles strong, curved: lfts. 7–9, suborbicular to broad-ovate or obovate, 1–2.5 cm. long, usually obtuse, coarsely serrate, dark green and lustrous above, lighter green and lustrous beneath, glabrous; stipules dentate: fls. 4–5 cm. across, white, fragrant, in few- to many-fld. pyramidal corymbs; styles pubescent; pedicels slightly glandular-hispid: fr. ovoid, about 1 cm. long. Fl.VII–IX. B.M.7421(c). W.R.59,t(c). R.H.1898: 105,t(c),106. G.F.4:569;6:337. G.C.II.22:99. C.L.A.7:621. M.G.13:580–5(h). (*R. Luciae* var. *W.* Koidz., *R. bracteata* Hort., not Wendl.) Japan, Korea, Formosa, E. China. Intr. 1891. Zone V.—Handsome Rose well adapted for covering banks and rocky slopes. Many hybrids have been raised.

R. W. × *rugosa* = **R. Jacksònii** Willm. Lfts. larger, rugose above; fls. bright crimson. R.W.63,t(c). Here belongs "Lady Duncan."—*R. W.* × *multiflora* "Crimson Rambler" = **R. Barbieràna** Rehd. Lfts. 5–7, larger: fls. single, carmine, 4–5 cm. across; petals whitish at the base. R.H.1901:20,t(c). (*R. Wichuraiana* var. *rubra* André.) Orig. before 1900.—There are also numerous hybrids of *R. W.* with Hybrid Teas and Hybrid Perpetuals (G.F.6:337. Mn.8:27, 156).

A closely related species is **R. Lùciae** Franch. & Rochebr. Of more upright habit: lfts. usually 7, narrower and thinner: fls. smaller. N.K.7:t.2. E. China, Korea, Japan. Intr.?

13. **R. sempérvirens** L. Evergreen or half-evergreen shrub with trailing or climbing stems: lfts. 5–7, ovate-lanceolate, 2–5 cm. long, acuminate, serrulate, lustrous above and beneath, glabrous: fls. 3–5 cm. across, in few-, rarely many-fld. corymbs, slightly fragrant; pedicels glandular-hispid; styles usually pubescent: fr. subglobose or ovoid, about 1 cm. long, orange-red. Fl.VI–VII. B.R.465(c). W.R.19,t(c). S. Eu., N. Afr. Zone VI? or VII.—Var. **prostràta** Desv. Lfts. elliptic, acute, smaller: styles glabrous; fr. ovoid. (*R. p.* Lindl.) —Var. **scándens** Nichols. Lfts. elliptic to oblong, obtuse: fr. subglobose. (*R. s.* Mill.)—Some double-fld. forms like "Felicité perpetuelle" are probably hybrids with *R. chinensis*.

14. **R. arvénsis** Huds. Deciduous shrub with trailing stems: lfts. usually 7, ovate to elliptic-ovate, 1–3.5 cm. long, acute, serrate, dull above, glabrous or slightly pubescent beneath, rather thin: fls. 3–5 cm. across, scentless, in few-fld. corymbs or solitary; styles glabrous: fr. ovoid. Fl.VI–VII. B.M. 2054(c). W.R.11,t(c). S.E.3,t.476(c). F.D.25:t.2633(c). Gn.60:233;77:510. (*R. repens* Scop., *R. silvestris* Herrm.) Eu. Cult. 1750. Zone V.—Var. **Ayreshìrea** Ser. Ayreshire R. More vigorous: lvs. green on both sides, remaining longer on the brs. B.M.2054(c). (*R. capreolata* Neill, *R. a.* var. *c.* Bean.)—The forms with double fls. often called Ayreshire Roses are probably hybrids with other Roses.

R. a. × *chinensis* = **R. rùga** Lindl. Trailing: fls. large, pink, double, fragrant, in several-fld. corymbs. B.R.1389(c). W.R.55,t(c). Orig. before 1830.—*R. a.* × *gallica* = **R. Polliniàna** Spreng. Upright or sarmentose: lfts. usually 5, of firmer texture, slightly pubescent beneath: fls. long-stalked, large, white to pink. W.R. 333,t(c). Eu. Cult. 1820.

Sect. 3. Banksianae Lindl. Evergreen climbing shrubs with slender glabrous brs. armed with hooked prickles or unarmed: lfts. 3–7; stipules free, subulate, caducous: fls. in corymbs, white or yellow; sepals entire, reflexed after flowering, deciduous. Two species in China.

15. **R. Bánksiae** R. Br. Banks' R. Climbing to 6 m., with sparingly prickly or unarmed brs.: lfts. 3–5, rarely 7, elliptic-ovate to oblong-lanceolate, 2–6 cm. long, acute or obtusish, serrulate, glabrous except at base of midrib beneath; rachis pubescent: fls. white or yellow, 2.5 cm. across, slightly fragrant, on slender smooth stalks in many-fld. umbels: fr. small, globose. Fl.

VI–VIII. Gn.83:107(h). China.—Var. **normàlis** Reg. Fls. single, white. G.C. III.31:539. J.L.27:501. Cult. 1877.—Var. **albo-plèna** Rehd. Fls. double, white, fragrant. B.M.1954(c). Intr. 1807. The typical form.—Var. **lùtea** Lindl. Fls. double, yellow, scentless. B.R.1105(c). (F. *luteo-plena* Rehd.) Intr. 1824.—Var. **lutéscens** Voss. Fls. single, yellow. B.M.7171(c). Intr. about 1870.

R. B. × *laevigata*? = **R. Fortuneàna** Lindl. Climbing shrub with sparingly prickly stems: lfts. 3–5, ovate-lanceolate, lustrous: fls. solitary, large, double, white; pedicels hispid. W.R.36,t(c). F.S.7:256(c). J.F.2:27. Intr. 1850. Zone VII?

A related species is **R. microcárpa** Lindl. Brts. slender, with hooked prickles: lfts. 3–7, elliptic to ovate-lanceolate, glabrous: fls. small, white, in many-fld. corymbs; styles exserted, pubescent: fr. small, globose. G.C.III.37:227. (*R. indica* L., in part, *R. sorbiflora* Focke.) China. Intr. ? 1904. Zone VII?

Sect. 4. BRACTEATAE Thory. Evergreen shrubs with erect or sarmentose, tomentose or pubescent brs.; prickles in pairs; stipules slightly adnate and pectinate: infl. with large bracts; sepals entire, reflexed after flowering; receptacle tomentose. Two Asiatic species.

16. **R. bracteàta** Wendl. MACARTNEY R. Stems sarmentose or procumbent, tomentose, with stout hooked prickles: lfts. 5–9, elliptic to obovate, 1.5–5 cm. long, obtuse or acutish, crenate-serrulate, lustrous above, glabrous or pubescent on midrib beneath; rachis glabrous: fls. solitary, white, 5–7 cm. across, short-stalked, with large laciniated pubescent bracts at base: fr. globose, 3–3.5 cm. across, orange-red, woolly. Fl.VIII. B.M.1377(c). B.B. 2:268. Gn.70:192. W.R.125,t(c). (*R. Macartnea* Dum.-Cours.) China; naturalized from Va. to Fla. and Tex. Intr. 1793. Zone VII.

R. b. × *laevigata*. Here belongs Marie Leonida (*R. alba odorata*) with creamy white double fls.

A closely related species is **R. clinophýlla** Thory, with straight prickles and acute lfts. often pubescent beneath; rachis pubescent. B.R.739(c). R.R.3,gr.24,2. (*R. involucrata* Roxb., *R. Lyellii* Lindl.) India. Intr. before 1817; probably not hardy.—*R. c.* × *persica* = *R. Hardii*; see under No. 1.

Sect. 5. LAEVIGATAE Thory. Evergreen shrubs with scattered hooked prickles: lfts. usually 3; stipules almost free: fls. solitary, large, without bracts; sepals erect, entire, persistent; pedicels and receptacles densely bristly.

17. **R. laevigàta** Michx. CHEROKEE R. To 5 m. high: lfts. 3, rarely 5, elliptic-ovate to lance-ovate, 3–6 m. long, acute or acuminate, sharply and finely serrate, glabrous and lustrous, reticulate beneath: fls. white, rarely rose-colored, 6–8 cm. across, fragrant: fr. pyriform, bristly, 3.5–4 cm. long. Fl.v. B.M.2847(c). B.R.1922(c). W.R.117,t(c). G.C.III.6:497. Gn.68: 206(h);71:225(h). M.G.21:397. Gn.M.38:174(h). (*R. cherokeensis* Donn, *R. sinica* Murr., *R. ternata* Poir., *R. Camellia* Hort.) China; naturalized from Ga. to Fla. and Tex. Intr. before 1780 to Am. Zone VIII.

R. l. × ? *odorata* = **R. anemonoïdes** Rehd. ("Anemone Rose"). With large single light pink fls. R.H.1901:548,t(c). W.R.41,t(c). M.G.11:345. Gn.62:413; 77:340;80:309. Orig. before 1896.—*R. l.* × *dilecta*. Here belongs "Silver Moon."

Sect. 6. INDICAE Thory. Stems upright or procumbent, with sparse, hooked prickles: lfts. 3–5, rarely 7, glabrous; stipules and bracts narrow: infl. 1–many-fld.; sepals entire or sparingly lobed, reflexed after flowering: styles exserted, free. Two Chinese species.

18. **R. odoràta** Sweet. TEA R. Evergreen or half-evergreen, with long, sarmentose, often climbing, brs.; prickles scattered, hooked: lfts. 5–7, elliptic or ovate to oblong-ovate, 2–7 cm. long, acute or acuminate, sharply serrate, lustrous above, glabrous: fls. solitary or 2–3, on rather short, often glandular stalks, 5–8 cm. across. Fl.VI–IX. B.R.804(c). R.R.3:gr.25,19(c). (*R. Thea* Savi, *R. chinensis* var. *fragrans* Rehd., *R. indica* var. *fragrans* Thory, *R. indica* var. *odoratissima* Lindl.) China. First intr. in the double blush form

in 1810. Zone VII or VIII.—Var. **ochroleùca** Rehd. With pale yellow double fls. R.R.3:gr.25,20(c). Andrews, Ros.2:t,77(c). Intr. 1824.—Var. **pseudíndica** Rehd. Fortune's Double Yellow. (Beauty of Glazenwood, Gold of Ophir.) Fls. salmon-yellow, outside tinged with red, double, 7–10 cm. across. B.M.4679(c). W.R.85,t(c). F.S.8:t.769(c).—Var. **gigantèa** Rehd. & Wils. Very vigorous, climbing to 10 m.: fls. creamy white, single, 10–15 cm. across; pedicels and receptacle smooth. B.M.7972(c). W.R.34(c). G.C.III.6:13; 37:136;51:314. Gn.67:179;71:67. (*R. g.* Collet & Hemsl.) S. W. China, Burma. Intr. 1889. Zone VIII.—Var. **erubéscens** Rehd. & Wils. A form of the preceding var. with blush or pale pink fls., often smaller. W. China. Intr.? This form or the preceding var. is probably the phylogenetic type of the Tea Rose.

R. o. gigantea × *Brunonii*. Here belongs "Madelaine," "Lemoine," "Montanosa," "Montecito" with paniculate fls.—*R. o.* × *borboniana* = **R. dilécta** Rehd. Here belong the hybrid Tea Roses which are hybrids between the Tea Rose and the Hybrid Perpetuals and of which "La France" may be considered a typical representative.—*R. o.* (or *dilecta*) × *rugosa* = *R. Bruantii;* see under No. 41.

19. **R. chinénsis** Jacq. China R. Low upright shrub with stout more or less hooked prickles, sometimes nearly unarmed: lfts. 3–5, broad-ovate to ovate-oblong, 2.5–6 cm. long, acuminate, serrate, lustrous and dark green above, pale beneath, glabrous: fls. usually several, rarely solitary, on long, usually glandular stalks, rarely short-stalked, about 5 cm. across, crimson to pink or nearly white: fr. 1.5–2 cm. long. Fl.vi–ix. W.R.79,t(c). Jacquin, Obs. Bot. 3:t.55(c). (*R. indica* Lindl., not L., *R. sinica* L.—Bengal R.) China. Cult. 1768. Zone VII?—Var. **semperflòrens** Koehne. Crimson China R. (Chinese Monthly R.). Stems slender, prickly or nearly unarmed; lfts. rather thin, mostly stained with purple: fls. usually solitary on long slender pedicels, crimson or deep pink. B.M.284(c). W.R.89,t(c).—Var. **mínima** Voss. Fairy R. Dwarf shrub, rarely exceeding 25 cm., with small rose-red fls., about 3 cm. across, single or double. B.M.1762(c). B.R.538(c). R.R.3:gr.25,6,7(c). (*R. Lawrenciana* Sweet.) Hybrids of this var. with *R. multiflora* forms are the "Baby Ramblers."—Var. **viridiflòra** Dipp. With monstrous green fls.; the petals transformed into small green lvs. F.S.11: 1136(c). Orig. about 1855.

R. c. × *arvensis* = *R. ruga;* see under No. 14.—*R. c.* × *moschata* = *R. Noisettiana;* see No. 20.—*R. c.* × *rugosa* = *R. calocarpa;* see under No. 40.—*R. c.* × *blanda* = *R. Aschersoniana;* see under No. 44.—*R. c.* × *pendulina* = *R. Lheritierana;* see under No. 45.

20. × **R. Noisettiàna** Thory (*R. chinensis* × *moschata*). Noisette R. (Champney R.) Shrub to 3 m. with upright or spreading stems; prickles reddish: lfts. 5–7, usually oblong-ovate to oblong-lanceolate, glabrous: fls. usually in many-fld. corymbs, white to pink or red, sometimes yellow; styles exserted, pubescent, loosely cohering. W.R.32(c). Gn.71:335. B.S.2:437. Orig. about 1816.—Here belongs the Manetti Rose (*R. Manettii* Crivelli, *R. chinensis* var. *M.* Dipp.), a vigorous shrub with semidouble or single fls. (B.C.5:2988), often used as stock for Tea and China Roses.

21. × **R. borboniàna** Desp. (*R. chinensis* × *gallica*). Bourbon R. Upright shrub with prickly and often glandular-hispid stems: lfts. usually 7, ovate to lance-ovate, acute, lustrous above, slightly pubescent beneath: fls. solitary or few in a corymb, on glandular pedicels, double or semidouble, usually purple. W.R.339,t(c). (*R. borbonica* Morr.) Fl.vii–ix. Orig. before 1819. By crossing this hybrid with the different Roses of the Gallicae group, the Hybrid Bourbon Roses have originated and these crossed with *R. chinensis*

and its vars. have produced the Hybrid Perpetuals or Remontant Roses. All these hybrids may be included in *R. borboniana* in an enlarged sense.

R. b. × *odorata* = *R. dilecta;* see under No. 18.—*R. b.* × *rugosa* = *R. arnoldiana;* see under No. 40.

Sect. 7. Gallicanae DC. Upright usually low shrubs: stems usually with hooked prickles mixed with bristles; stipules narrow, adnate: lfts. 3–5, usually firm: fls. few, often with narrow bracts or solitary on a usually bractless pedicel; sepals often lobed, reflexed after flowering, deciduous; styles not exserted. Three or possibly one species in Eu. and W. Asia.

22. **R. gállica** L. French R. Upright shrub, with creeping root-stock, rarely 1.5 m. tall; stems usually densely covered with prickles and bristles: lfts. 3–5, broad-elliptic or ovate, 2–6 cm. long, obtusish or abruptly acuminate, rounded or subcordate at base, doubly glandular or sometimes simply serrate, dark green and rugose above, paler and pubescent beneath, firm, deflexed; petiole and rachis bristly and glandular-hispid; stipules glandular-ciliate: fls. solitary, pink or crimson, 4–7 cm. across, on rather long stout pedicels glandular-hispid and bristly; receptacle glandular-hispid; sepals glandular outside: fr. subglobose or turbinate, brick-red. Fl.vi. W.R.325,t(c). F.D.25:t.2634(c). B.M.1377(c). G.H.1:t.89(c). C. and S. Eu., W. Asia. Long cult. Zone V.—Var. **pùmila** H. Br. Dwarf form, with creeping root-stock: fls. red, single. R.R.2:gr.16,12(c).—A closely related form, less prickly, with narrow lfts., large light crimson fls. and ovoid fr. is var. *incarnata* Rehd., not Voss. (*R. i.* Bor., not Mill.) B.M.7035(c).—Var. **officinàlis** Thory. With double fls., otherwise like the typical form. W.R.359,t(c). (Var. *plena* Reg., *R. provincialis* Mill.)—Var. **Ágatha** Thory. With rather small double purple fls., the outer petals spreading, the inner ones concave. R.R.2:gr.17, 17–21.—Var. **versícolor** L. Fls. semidouble; petals striped, white and red. R.R.2:gr.16,12(c). (Var. *rosa-mundi* West.) It has been confused with a similar form of *R. damascena.*

R. g. × *canina* = **R. Waitziàna** Tratt. With scattered, usually slightly curved and unequal prickles: lfts. rather firm, usually simply serrate, nearly glabrous or pubescent on the midrib beneath; pedicels stipitate-glandular; sepals glandular on back: fls. large, usually deep rose-pink, 6–8 cm. across, often solitary. Eu. Cult. 1874.—Var. **macrántha** Rehd. Prickles nearly equal: lfts. nearly glabrous beneath: fls. several; pedicels slightly glandular; fls. flushed rose at first, becoming nearly white. Gn.52:465,t.f.1(c). R.H.1901:541,t.f.2(c). W.R.2:403,t(c). Intr. about 1825. —*R. g.* × *tomentosa* = **R. Marcyàna** Boullu. To 1 m. tall; stems prickly and bristly: lfts. 5–7, broad-oval, 2–5 cm. long, pubescent on both sides: fls. pink to light purple, 6–7 cm. across, long-stalked. W.R.335,t(c). (? *R. thercbinthinacea* Bess.) Spont. in S. France.—*R. g.* × *cinnamomea* = **R. francofurtàna** Muenchh. To 2 m.; stem with straight or hooked prickles, flowering brts. nearly unarmed: lfts. 5–7, elliptic, serrate, pubescent beneath; upper stipules much dilated: fls. 5–7 cm. across, single or double, purple, slightly fragrant, receptacle at base and pedicels glandular-hispid; sepals erect after flowering, entire or nearly so: fr. turbinate. Fl.vi. F.D.25:t.2628(c). R.R.3:gr.23,1(c). (*R. turbinata* Ait.) Orig. before 1770. —*R. g.* × *moschata* = *R. Dupontii;* see under No. 8.—*R. g.* × *arvensis* = *R. Polliniana;* see under No. 14.—*R. g.* × *chinensis* = *R. borboniana;* see No. 21.—*R. g.* × *dumetorum* = *R. alba;* see No. 25.

23. **R. centifòlia** L. Cabbage R. Closely related to the preceding; taller, to 2 m.; root-stock less creeping; prickles more unequal, partly stouter: lfts. usually 5, pubescent on both sides or only beneath, often simply serrate, larger and thinner; rachis not prickly: fls. usually pink, very double, nodding, on long and slender, very glandular pedicels, fragrant; petals inflexed; sepals persistent: fr. ellipsoid to subglobose. Fl.vi–vii. W.R.341,t(c). R.R.gr.14, 1–12. G.1:340. (*R. gallica* var. *c.* Reg.) E. Cauc. Only the double form in cult.; known already to the ancients.—Var. **muscòsa** Ser. Moss R. Fls. rose, with pedicels and calyx glandular-mossy. B.M.69(c). Gn.18:84(c).

G.W.7:125.—Var. **albo-muscòsa** Willm. Like the preceding, but fls. white. B.R.102(c). W.R.349,t(c).—Var. **cristàta** Prevost. Similar to var. *muscosa*, but the mossy excrescences confined to the edges of the sepals. B.M.3475(c). W.R.351,t(c). G.W.7:125.—Var. **pompònia** Lindl. Pompon R. Dwarf: lfts. elliptic, about 2.5 cm. long, glabrous above: fls. bright red, double, 3–3.5 cm. across; pedicels densely setose. W.R.353,t(c). (*R. pulchella* Willd., *R. dijonensis* Roess.)—Var. **parvifòlia** Rehd. Burgundian R. Similar to the preceding: lfts. 1–2 cm. long: fls. about 2.5 cm. across; pedicels slightly setose. B.R.452(c). W.R.355,t(c). (*R. p.* Ehrh., *R. burgundensis* West., *R. burgundiaca* Roess., *R. gallica* var. *p.* Ser.)

A related species is **R. Richârdii** Rehd. Low shrub with unequal scattered hooked prickles: lfts. 3–5, elliptic to ovate-oblong, rugose above, pubescent beneath: fls. few, pale rose, 5–7 cm. across; sepals large, pinnately lobed, leafy at apex. W.R.337,t(c). (*R. sancta* Rich., not Andrews.) Abyss. Cult. 1902. Zone VII?

24. **R. damascèna** Mill. Damask R. Shrub to 2 m.; stems usually with numerous stout hooked prickles, sometimes mixed with glandular bristles: lfts. usually 5, sometimes 7, ovate to ovate-oblong, 2–6 cm. long, simply serrate, glabrous above, more or less pubescent beneath; petioles prickly; stipules sometimes pectinate: fls. blush to red, double, in corymbs, on slender pedicels glandular-hispid and prickly; sepals reflexed during anthesis, deciduous, glandular-hispid on back like receptacle: fr. obovoid, 2.5 cm. long, bristly, red. Fl.vi–vii. W.R.369,t(c). R.R.2:gr.16,6(c). (*R. belgica* Mill., *R. polyanthos* Roess., *R. gallica* var. *d.* Voss.) Intr. from Asia Minor in the 16th century.—Var. **versícolor** West. York and Lancaster R. Fls. semidouble, white and striped and blotched pink, or some fls. white and some pink. Lawrence, Coll. Ros.t.10(c). (Var. *variegata* Thory.)—Var. **triginta-pétala** Dieck. With semidouble red fls. Gt.38:129. G.C.III.7:45. Cult. in S. Eu. for the manufacture of attar.

25. × **R. alba** L. (?*R. dumetorum* × *gallica*.) Upright shrub to 2 m.; stem with unequal hooked prickles, sometimes mixed with bristles: lfts. usually 5, broad-elliptic or ovate to oblong-ovate, 2–6 cm. long, simply serrate, pubescent beneath; upper stipules dilated: fls. more or less double, 6–8 cm. across, white or blush, fragrant, corymbose; pedicels glandular-hispid; receptacle usually smooth above; sepals glandular-bristly, deciduous: fr. oblong-ovoid, 2 cm. long, scarlet. Fl.vi. Andrews Ros. t.10(c). Origin unknown. Intr. 1597.—Var. **suavéolens** Dieck. Cult. in S. E. Eu. for Attar of Roses.—Var. **incarnàta** West. Fls. double, white, tinged with pink. W.R. 413,t(c). (*R. incarnata* Mill., *R. alba* var. *rubicunda* Roess.)

The closely related *R. collina* Jacq. with rose-colored fls. and shorter sepals is probably of the same origin and referable to *R. alba*.

Sect. 8. Caninae. Stems upright or arching, usually with numerous hooked or rarely straight prickles; upper stipules dilated: corymbs usually many-fld., with dilated bracts; outer sepals lobed, reflexed after anthesis and deciduous or erect and persistent.

26. **R. villòsa** L. Densely branched shrub to 2 m., with almost straight slender spines: lfts. usually 5–7, on shoots sometimes 9, elliptic to elliptic-oblong, acute or obtuse, 3–5 cm. long, doubly glandular-serrate, grayish green and pubescent above, tomentose beneath and glandular, rarely glabrescent; auricles of stipules falcate: fls. 1–3, pink, 3–5 cm. across; pedicels bristly and stipitate-glandular: fr. usually subglobose, to 2.5 cm. across, hispid, with persistent upright sepals. Fl.vi–vii. B.M.7241(c). W.R.435,t(c). G.H.t.88(c). F.D.25:t.2632(c). (*R. pomifera* Herrm., *R. v.* var. *pomifera* Desv.) Eu., W.

Asia. Cult. 1771. Zone V.—Var. **duplex** West. With semidouble fls. W.R. 436,t(c).

A closely related species is **R. mollis** Smith. Low shrub; brts. purplish, bloomy: lfts. silky-tomentose beneath, less glandular, smaller: pedicels sparingly glandular: fr. smaller, not hispid, sometimes stipitate-glandular; sepals short, nearly entire. W.R.417,t(c). (*R. villosa* var. *mollissima* Rau.) Eu., W. Asia. Intr. 1818. Zone V.—Another closely related species is **R. hawrâna** Knet. Flowering brts. usually unarmed; lfts. elliptic, glabrous above, pubescent beneath: fls. pink, 5 cm. across: fr. globose, densely bristly. W.R.431,t(c). Hungary. Cult. 1914.—Other related species are: **R. orientâlis** Dup. Dwarf: prickles subulate; young brts. densely pubescent: lfts. 1–2 cm. long, simply serrate, pubescent on both sides: fls. solitary, pink, short-stalked; pedicels villous, glandular and bristly: fr. ellipsoid, sepals upright. S.H.1:f.321k-n,322g. S. E. Eu., W. Asia. Intr. ?—**R. Heckeliâna** Tratt. Very similar, but prickles stouter, hooked, and fls. smaller. S. Eu. Intr. ?—**R. elymaïtica** Boiss. & Hausskn. Shrub to 1 m., with zigzag pruinose brs.; prickles stout, curved: lfts. usually 5, 5–15 mm. long, tomentose below: fls. pink, small; styles exserted, tomentose; pedicels and receptacle stipitate-glandular: fr. globose, about 1 cm. across; sepals reflexed. S.H.1:f.322g′(l). N. Persia. Intr. 1900. Zone VII?

27. **R. tomentôsa** Smith. Shrub to 2 m.; brts. often zigzag; young brts. often bloomy; prickles stout, curved or straight: lfts. 5–7, elliptic or ovate, acute or short-acuminate, 2–4 cm. long, doubly serrate, finely pubescent above, tomentose and glandular beneath; stipules with short triangular spreading auricles: fls. pale pink or nearly white, about 4 cm. across; pedicels often glandular-hispid; sepals lobed, fr. subglobose, 1–2 cm. across, stipitate-glandular; sepals usually deciduous before maturity. Fl.vi. W.R.421,t(c). S.E.3:t.467(c). F.D.25:t.2631(c). Gn.77:511. Eu. Cult. 1820; occasionally escaped in the E. States. Zone V.

R. t. × *gallica* = *R. Marcyana;* see under No. 22.—*R. t.* × *spinosissima* = *R. involuta;* see under No. 64.

28. **R. eglantèria** L. Sweet-Brier. (Eglantine.) Much branched shrub to 2 m.; prickles strong, hooked, sometimes mixed with bristles: lfts. 5–7, orbicular to oval, 1–3 cm. long, obtuse or acutish, dark green and glabrous above, pubescent beneath, glandular on both sides, fragrant: fls. 1–3, bright pink, 3–5 cm. across, on short glandular-hispid pedicels; receptacle glandular-hispid: fr. subglobose or ovoid, orange to scarlet, with more or less spreading, tardily deciduous sepals. S.E.3:468(c). D.F.25:t.2630(c). N.D.7:t.7(c). (*R. rubiginosa* L.) Eu.; often naturalized in N. Am.—Var. **duplex** West. With double fls. W.R.449,t(c).—Planted for its aromatic foliage.

R. e. × *foetida* = *R. Penzanceana;* see under No. 69.

Closely related species are: **R. ellíptica** Tausch. Dense shrub to 2 m.: lfts. elliptic to obovate-oblong, 1.5–3 cm. long, cuneate, pubescent beneath: fls. pinkish or white; pedicels short, usually eglandular. S.H.1:f.323h-i. Eu. Intr. ?—**R. sícula** Tratt. Low shrub with slender, nearly straight, subequal prickles: lfts. 5–9, orbicular to elliptic, glabrous and glandular, 6–12 mm. long: fls. usually solitary, 2.5–3 cm. across: fr. small, globose. B.M.7761(c) and G.W.8:17(h), as *R. Seraphinii.* S. Eu., N. Afr. Intr. before 1894. Zone VII?—**R. glutinôsa** Sibth. & Sm. Dwarf; prickles unequal, partly scattered, straight, to 1 cm. long, and partly bristly, gland-tipped and very numerous: lfts. elliptic to obovate, 1–3 cm. long, densely glandular: fls. small, pink: fr. globose, small. S.F.5:t.482(c). W.R.467, t(c). S. E. Eu., W. Asia. Intr. 1821.—Var. **dalmàtica** Borb. Fr. ellipsoid, 2–2.8 cm. long. B.M.8826(c). (*R. d.* Kern.) Cult. 1882.

29. **R. micrántha** Sm. Much-branched shrub, to 2 m., with arching brs. armed with uniform curved prickles, without bristles: lfts. 5–7, broad-ovate, 1.5–3 cm. long, short-acuminate, doubly glandular-serrate, glabrous or pubescent above, pubescent and glandular beneath: fls. 1–4, pink to white, about 3 cm. across; styles glabrous, somewhat exserted; pedicels glandular-hispid: fr. ovoid or subglobose, with spreading or reflexed deciduous sepals. Fl.vi.

W.R.461,t(c). S.E.3:t.469(c). D.F.25:t.2630,II(c). B.B.2:f.2316 (as *R. rubiginosa*). Eu., Mediterr.; often escaped throughout N. Am. Zone V.

Related species are: **R. férox** Bieb. Dwarf, with unequal prickles: lfts. broad-ovate to elliptic, 1–1.5 cm. long, glandular beneath and often above: fls. white, usually 3 cm. across; pedicels short; styles short. W.R.477,t(c). S.H.1:f.323n-o, 324e. S. E. Eu., Cauc., Asia Minor. Intr. 1796.—**R. agréstis** Savi. Shrub to 3 m. with elongated brs.; prickles subequal: lfts. oblong to oblong-obovate, 1.5–5 cm. long, usually cuneate, pubescent or nearly glabrous: fls. whitish or pinkish; pedicels eglandular; style somewhat exserted. W.R.457,t(c). S.E.3:t.470(c). (*R. sepium* Thuill.) Eu., N. Afr. Cult. 1878.—Var. **inodòra** Kell. Lfts. obovate, pubescent beneath. W.R.469,t(c). (*R. i.* Fries.)—**R. Serafínii** Viv. Low shrub with copious, unequal, partly hooked prickles: lfts. orbicular-ovate, 5–12 mm. long, glandular beneath, glabrous: fls. solitary, pink, on very short eglandular pedicels; sepals lobed, reflexed after anthesis, finally deciduous. W.R.475,t(c). (*R. Seraphinii* Viv.) Mediterr. Cult. 1914.

30. **R. stylòsa** Desv. Shrub to 3 m., with arching brs.; prickles stout, hooked: lfts. 5–7, elliptic to elliptic-oblong, 1.5–5 cm. long, acute, serrate, lustrous above, pubescent beneath, rarely glabrous, eglandular; rachis pubescent, usually prickly: fls. 1–18, white or light pink, 3–5 cm. across; pedicels glandular; styles usually shorter than stamens: fr. ovoid, outer sepals with many lobes. W.R.47,t(c). S.E.3:t.475(c). S.H.1:f.323s-s^2,-324i-k. (*R. systyla* Bast.) Eu. Cult. 1838. Zone V.

31. **R. dumetòrum** Thuill. Upright shrub to 3 m., with spreading or arching brs.; prickles stout, hooked: lfts. 5–7, closely set, orbicular-oval to elliptic, 2.5–4 cm. long, rounded or subcordate, usually simply serrate, pubescent on both sides or only below on the veins: fls. 1 to many, 4–5 cm. across; pedicels usually long, glabrous or glandular; sepals soon reflexed, deciduous: fr. ovoid or subglobose, 1.5–2 cm. long, orange-red, usually smooth. Fl.VI. W.R.397,t(c). S.E.3:t.491(c). Gs.3:134(h). Eu., W. Asia, Afr. Cult. 1838; rarely escaped. Zone V.

R. d. × *gallica* = *R. alba;* see No. 25.

A closely related species is **R. coriifòlia** Fries. Lower: lfts. usually cuneate at base: fls. short-stalked; bracts large; sepals upright, long-persistent. W.R.391,t(c). S.E.3:t.472(c). Eu., W. Asia. Cult. 1878.—Var. **Froebèlii** Rehd. Of more vigorous habit: lfts. simply or doubly serrate, bluish green: fls. small, white. (*R. canina* var. *F.* Christ, *R. laxa* Froeb., not Retz.) Cult. 1890.

32. **R. canìna** L. Dog R. Shrub to 3 m., with often arching brs.; prickles stout, hooked: lfts. 5–7, oval or elliptic, 2–4 cm. long, doubly or simply serrate, glabrous or slightly pubescent beneath; upper stipules dilated: fls. 1–3, light pink or white, 4–5 cm. across; pedicels usually glabrous, 1–3 cm. long; receptacle ellipsoid, usually smooth; sepals usually lobed, later reflexed and finally deciduous: fr. scarlet, ellipsoid, 1.5–2 cm. long. Fl.VI. W.R. 379,t(c). S.E.3:t.474(c). D.F.25:2629(c). N.D.7:t.11(c). B.B.2:f.2312. Eu. —Var. **éxilis** Keller. Low form: lfts. small, 6–10 mm. long: fls. pink, 2.5 cm. across. W.R.385,t(c). (*R. e.* Crép.)—Much used as stock for grafting.

R. c. × *gallica* = *R. Waitziana;* see under No. 22.—*R. c.* × *spinosissima* = *R. hibernica;* see under No. 64.

Related species are: **R. glaùca** Vill., not Pourr. Brts. often pruinose, very prickly: lfts. close-set, broad-ovate, sharply serrate, bluish green: fls. rose-red; pedicels short; sepals lobed, upright, long-persistent. S.H.1:f.324p,325a-a′. (*R. Reuteri* God.) Eu., W. Asia. Cult. 1872.—**R. britzénsis** Koehne. Prickles slender: lfts. 7–11, elliptic, 2.5–3.5 cm. long, usually simply serrate: fls. 1–2, pale pink, changing to white, 3–4 cm. across: fr. brown, with upright sepals. M.D.1910:94. Gs.4:102. S.H.2:f.593a-e. Kurdistan. Intr. 1901.—**R. montàna** Chaix. Prickles nearly straight: lfts. broad-ovate, cuneate, obtuse, often tinged bluish violet: fls. pink; pedicels with purplish black stalked glands and bristles: fr. large, oblong-ellipsoid, with persistent lobed sepals. S.H.1:f.325c-c,326b. S. Eu., N. Afr. Cult. 1872.—**R. Jundzíllii** Bess. Prickles straight or nearly straight, rather slender: lfts. 3–7, ovate to elliptic, doubly glandular-serrate, nearly glabrous, usually

glandular beneath: fls. pink, 5–7 cm. across; pedicels long, glandular and bristly: fr. subglobose to ellipsoid, smooth; sepals deciduous. W.R.463,t(c). S.H.1:f.321e-f, 322f. Eu., W. Asia. Cult. 1870.—Has some resemblance to *R. gallica.*

33. **R. rubrifòlia** Vill. Upright shrub to 2 m., with slender purplish bloomy brts.; prickles few, hooked or straight, rather small: lfts. 7–9, elliptic to ovate-lanceolate, 2–3.5 cm. long, simply serrate, bluish green and more or less tinged with purplish red, glabrous: fls. few, deep red, 3–3.5 cm. across; pedicels glabrous or with few bristles; sepals usually entire, longer than petals, deciduous; fr. subglobose, about 1.5 cm. across, bright red, smooth. Fl.VI–VII. W.R.399,t(c). B.R.430(c). G.W.7:139(h). F.D.25:2627(c). (*R. ferruginea* Déségl., not Vill., *R. glauca* Pourr.) Mts. of C. and S. Eu. Intr. 1814.—A striking species on account of its purplish foliage and purplish stems: fls. rather inconspicuous.

Sect. 9. CAROLINAE. Upright, mostly low shrubs; stems slender, with usually straight paired prickles and often with bristles; upper stipules usually narrow: corymbs usually few-fld.; sepals spreading after flowering, soon deciduous, the outer entire or with few erect lobes; pedicels and receptacle glandular-hispid, rarely smooth; achenes inserted only at the bottom of the usually depressed-globose receptacle. Only American species.

34. **R. palústris** Marsh. Upright shrub to 2 m., with slender glabrous, sometimes reddish stems: lfts. 7, rarely 9, elliptic to narrow-oblong, acute at ends, 2–5 cm. long, finely serrate, usually pubescent beneath at least on the veins; stipules narrow, involute: fls. usually corymbose, pink, about 5 cm. across; bracts leafy; pedicels short, usually glandular-hispid: fr. about 8 mm. high. Fl.VI–VIII. W.R.211,t(c). Em.2:488,t(c). M.N.1:t.43(c). B.B.2:285. (*R. carolina* L. 1762 partly, not 1753, *R. pennsylvanica* Michx.) N. S., Minn., Miss. and Fla. Intr. 1726. Zone IV.—Var. **Nuttalliana** Rehd. Fls. larger, 6 cm. across, appearing later and continuing until Sept.

R. p. × *virginiana* = **R. Mariae-Graèbnerae** Aschers. Lfts. more shining, broader, more coarsely toothed. Fl.VI–IX. Gt.51:t.1504,t.4(c). Orig. about 1880. Also found wild with the parents.—*R. p.* × *rugosa* = *R. Spaethiana,* see under No. 40.

35. **R. virginiàna** Mill. Shrub to 2 m., with few or no suckers; prickles often hooked, only young shoots bristly: lfts. 7–9, elliptic to obovate-elliptic, 2–6 cm. long, usually acute at ends, serrate with ascending teeth, dark green and lustrous above, glabrous or pubescent on veins beneath; upper stipules dilated: fls. usually few, sometimes solitary, 5–6 cm. across; pedicels and receptacle glandular-hispid: fr. 1–1.5 cm. across. Fl.VI–VII. W.R.197,t(c), 199,t.,308,t(c). N.D.7:t.7,f.2(c). Gt.56:t.1564,f.2(c). Gn.55:428;71:493. B. B.2:285. K.S.175. (*R. lucida* Ehrh., *R. humilis* var. *l.* Best., *R. blanda* var. *Willmottiana* Bak.) Nfld. to Va., Ala. and Mo. Intr. before 1807.—Var. **plèna** Rehd. Fls. double. Andrews, Ros.t.102(c). R.R.2:t,opp.p.7(c). (*R. rapa* Bosc.) Intr. before 1820.—Var. **lamprophýlla** Rehd. Of very dense habit, usually lower than 1 m.: lvs. of shoots usually 9-foliolate; lfts. elliptic to obovate, acute or sometimes obtuse, cuneate, very lustrous above; petioles usually reddish. Me. to Conn. Intr. 1881.—Handsome Rose with shining foliage and bright pink fls.

R. v. × *palustris* = *R. Mariae-Graebnerae;* see under No. 34.

36. **R. Lyònii** Nutt. Shrub to 1.5 m.; stems usually bristly; prickles slender: lfts. 5–7, elliptic to lance-elliptic, 1.5–5 cm. long, acute or rarely obtuse, serrate, dull and sparingly pubescent or glabrate above, pubescent beneath; rachis villous; stipules narrow or the upper dilated: fls. 1–4, rose, 5–6 cm. across; pedicels and receptacle glandular-hispid, rarely receptacle glabrous; sepals sometimes sparingly lobed; fr. 8–10 mm. across. House,

Wild Fl. N.Y.t.102(c). (*R. humilis* var. *villosa* Best, *R. carolina* var. *villosa* Rehd.) Mass. to Minn., s. to Ga., Ark. and Kansas. Cult. 1887. Zone V.—Var. **alba** Rehd. Fls. white and stems green. W.R.198,t(c). A.F.12:1098. Gg.5:306. M.G.19:205. Intr. about 1870.

37. **R. carolīna** L. Shrub to 1 m., suckering; stems with slender straight prickles, usually very bristly when young; brts. sometimes unarmed: lfts. usually 5, rarely 7, elliptic to lance-elliptic, rarely oblanceolate, 1–3 cm. long, acute or obtuse, sharply serrate with ascending teeth, glabrous, not or slightly lustrous above, paler beneath, pubescent on veins or nearly glabrous; stipules narrow: fls. usually solitary, rose, about 5 cm. across; pedicels and receptacle glandular-hispid; outer sepals lobed: fr. about 8 mm. across. Fl. VI–VII. W.R.201,t(c). M.N.2:t.9(c, as *R. lucida*). B.B.2:f.2314. (*R. humilis* Marsh., *R. parviflora* Ehrh., *R. virginiana* var. *humilis* Schneid.) Me. to Wis., Kans., Tex. and Fla. Intr. 1826. Zone IV.—Var. **grandiflōra** Rehd. Lfts. usually 7, obovate or oval; fls. about 6 cm. across. W.R.207,t(c). Lindl., Ros. Mon.t.3(c). (*R. obovata* Raf., *R. humilis* var. *g.* Bak., *R. virginiana* var. *g.* Bean.) Me. to Mich., Del. and Mo.—Var. **glandulōsa** Rehd. Lfts. doubly glandular-serrate and rachis glandular-hispid or stipitate-glandular. Ont. and Mass. to Fla. and n. Mex. K.S.174 (as *R. humilis*). (*R. serrulata* Raf., *R. parviflora* var. *g.* Crép.) Cult. 1902.—Handsome Rose well suited for borders of shrubberies.

R. c. × *spinosissima* = *R. Kochiana;* see under No. 64.

38. **R. nītida** Willd. Shrub to 0.5 m.; stems densely bristly and with slender prickles 3–5 mm. long: lfts. 7–9, close-set, elliptic to oblong, 1–3 cm. long, finely serrate, lustrous above, slightly pubescent or glabrous beneath; stipules, particularly the upper ones, dilated: fls. solitary or few, rose, 4–5 cm. across; pedicels and receptacle glandular-hispid; sepals usually entire: fr. about 1 cm. across. W.R.215,t(c),217,t. B.B.2:285. Nfld. to Conn. Cult. 1807. Zone IV.—Handsome dwarf Rose.

R. n. × *californica* = **R. Scharnkeāna** Graebn. Low shrub; stem with slender prickles, often bristly: lfts. 7–9, oblong, cuneate: fls. 1–5, rose-purple. Gt.51:t. 1504,f,2(c). Orig. before 1900.

39. **R. foliolōsa** Nutt. Low shrub to 0.5 m.; stem with short, straight, slightly reflexed prickles or nearly unarmed, rarely bristly; lfts. 7–9, rarely 11, narrow- to linear-oblong, 1–3 cm. long, acute, finely serrate, glabrous and lustrous above, glabrous or pubescent on the veins beneath; stipules usually narrow: fls. solitary or few, rose, sometimes white, about 4 cm. across; pedicels and receptacle sparingly glandular-hispid or the latter sometimes smooth: fr. subglobose, about 8 mm. across. B.M.8513(c). W.R.219,t(c). G.F.3:101. B.C.5:f.3445. Ark. and Okla. to Tex. Cult. 1880. Zone V.—Var. **alba** Bidwell. Fls. white. Cult. 1919.

Sect. 10. Cinnamomeae DC. Upright shrubs; prickles usually straight, in infrastipular pairs or scattered; stems often bristly: lfts. 5–11: infl. usually many-fld. with dilated bracts; sepals usually entire, upright after flowering and persistent, rarely deciduous; receptacle usually smooth.

40. **R. rugōsa** Thunb. Upright shrub to 2 m.; stems stout, tomentose, densely bristly and prickly: lfts. 5–9, elliptic to elliptic-obovate, 2–5 cm. long, acute or obtusish, serrate, lustrous and dark green, rugose and glabrous above, glaucescent, reticulate and pubescent beneath, thick and firm; petioles tomentose and bristly: fls. solitary or few, 6–8 cm. across, purple to white; pedicels short, bristly; receptacle smooth: fr. depressed-globose, smooth, brick-red, 2–2.5 cm. across. Fl.VI(–VIII). W.R.181,t(c). S.Z.1:t.28(c). B.R. 420(c). Gt.30:t.1049;42:537. Gn.52:384,t(c). G.C.II.14:372. C.L.A.2:76;

7:624. (*R. ferox* Ait., *R. Regeliana* André & Lind.) N. China, Korea, Japan. Intr. about 1845. Zone IV.—Forms of typical *R. rugosa* (*R. r.* var. *Thunbergiana* C. A. Mey.) are the following: Var. **típica** Reg. With purple fls.; the typical form. (Var. *rubra* Hort.)—Var. **rósea** Rehd. With rose-colored fls. —Var. **alba** Ware. With white fls. Gn.9:452,t(c). G.8:261. (Var. *albiflora* Koidz.)—Var. **albo-plèna** Rehd. With double white fls.—Geographical varieties are: var. **Chamissònis** C. A. Mey. Bristles almost absent from the brs.: lfts. narrower and smaller, less rugose. (*R. pubescens* Bak., not Roxb.) —A form with double purple fls. is var. **plèna** Reg. Gt.24:t.846. (Var. *rubroplena* Rehd.)—Var. **kamtchática** Reg. With slenderer, less densely armed brs., thinner and less rugose lfts. and smaller fls. and fr. B.M.3149(c). B.R. 419(c). N.K.7:t.8. (*R. k.* Vent.) Intr. about 1770.—*R. rugosa* is one of the most ornamental and at the same time most vigorous and hardy of the wild Roses, much planted for its handsome dark green lustrous foliage turning orange and scarlet in autumn, for its large fls. appearing during the whole summer and its large red fruits. Many hybrids have been raised.

R. r. × *arvensis* = **R. Paùlii** Rehd. Procumbent shrub with large white fls. in corymbs. Gn.86:286(h). (*R. rugosa repens alba* Paul.) Orig. before 1903.—*R. r.* × *chinensis* = **R. calocárpa** Willm. With single rose-colored fls. and handsome, abundantly produced fr. W.R.189,t(c),199,t. R.H.1895:446, 447. Gn.46:548; 52:384. Orig. before 1891.—*R. r.* × *odorata* (or *dilecta*) = **R. Bruántii** Rehd. Here belongs "Mad. Georges Bruant" (B.C.5:2992) and "Blanc Double de Coubert." Orig. before 1887.—*R. r.* × *borboniana* = **R. arnoldiàna** Sarg. Large semidouble deep crimson fls. Orig. before 1914. The typical form is a cross between *R. r.* and "Général Jacqueminot." The same cross is represented by "Mrs. Anthony Waterer." Orig. before 1900.—*R. r.* × *palustris* = **R. Spaethiàna** Graebn. Fls. corymbose, large, purple. Gt.51:t.1504,f.3(c), Cult. 1902.—*R. r.* × *blanda* = **R. warleyénsis** Willm. Lfts. 5–7, small: fls. pink. W.R.185,t(c). Orig. before 1910. —*R. r.* × *carolina*. Procumbent shrub with purple fls. W.R.203,t(c). (*R. humilis* × *r.* Koehne.) Orig. before 1893.—*R. r.* × *Roxburghii* = **R. micrugòsa** Henkel. Upright, very prickly shrub: lfts. small, pubescent. Gt.59:t.1581(c). R.H.1905:144. (*R. Vilmorinii* Bean.)—*R. r.* × *multiflora* = *R. iwara;* see under No. 2.—*R. r.* × *Wichuraiana* = *R. Jacksonii;* see under No. 12.

41. **R. aciculàris** Lindl. Low shrub, to 1 m.; stems densely bristly with weak prickles; brts. sometimes unarmed: lfts. 3–7, broad-elliptic to oblong, 1.5–5 cm. long, usually acute at ends, simply serrate, dull and glabrous above, pubescent beneath; stipules usually broad: fls. solitary, deep rose, 4–5 cm. across, fragrant; pedicels glabrous, rarely slightly glandular-hispid: fr. usually pear-shaped with distinct neck, 1.5–2 cm. long. Fl.v–vi. W.R.147, 149 235,t(c, as *R. Woodsii*). D.L.3:f.244. N.K.7:t.10. (*R. Sayi* Schwein.) Alaska to Wyo., Mich. and N. Y.; N. E. Asia. Intr. 1805. Zone V.—Var. **Engelmánnii** Crép. Flowering brts. usually bristly: lfts. doubly glandular-serrate, glabrous and glandular beneath: fr. ellipsoid or pear-shaped, smaller. G.F.2:377. B.C.5:2995. D.L.3:f.245. (*R. E.* S. Wats.) N. D. and Mont. to Colo. Intr. 1891.—Var. **Bourgeauiàna** Crép. Lfts. broad-elliptic, usually obtuse, more or less doubly glandular-serrate, slightly pubescent and glandular beneath: fr. subglobose, with very short neck. B.C.5:2994. B.B.2:f. 2309 (as *R. acicularis*). (*R. B.* Crép., *R. acicularis* var. *Sayi* Rehd.) Ont. to Colo., Mont. and Mackenzie.—Var. **nipponénsis** Hook. f. Lfts. 7–9, 1–3 cm. long, simply serrate, glabrous; petioles bristly: pedicels glandular-bristly: fr. ovoid, 1.5–2 cm. long. B.M.7646(c). W.R.151,t(c). (*R. n.* Crép.) E. Asia. Intr. 1894.

42. **R. arkansàna** Porter. Shrub to 0.5 m.; stems very prickly and bristly: lfts. 9–11, elliptic, 2–6 cm. long, acute, coarsely and sharply serrate, glabrous and lustrous above, glabrous or sparingly pilose on the veins beneath; stipules

dilated, glandular-dentate: fls. corymbose, pink, about 4 cm. across; pedicels glabrous: fr. subglobose, 1–1.5 cm. across. Fl.VI–VII. Wisc. and Minn. to Kans. and Colo. Cult. 1917. Zone IV.

43. **R. suffúlta** Greene. Low shrub to 0.5 m.; stems densely prickly and bristly, usually green; lfts., 7–11, broadly elliptic to obovate-oblong, 1.5–4 cm. long, usually obtuse, cuneate, simply serrate, finely pubescent on both sides or finally glabrous above; stipules dilated, glandular-dentate; petiole and rachis finely pubescent: fls. corymbose, pink, about 3 cm. across; pedicels and receptacle glabrous; sepals sometimes lobed: fr. globose, about 1 cm. across. Fl.VI. W.R.515,t(c). Mn.3:116. B.B.2:284. (*R. pratincola* Greene, not H. Br., *R. heliophila* Greene.) Alb. and Man. to Ill. and w. Tex. Intr.? Zone III.—Var. **alba** Rehd. Fls. white. Intr. 1901.

44. **R. blánda** Ait. Shrub to 2 m. with slender stems, unarmed or with scattered bristles when young, brown: lfts. 5–7, rarely 9, elliptic to obovate oblong, 2–6 cm. long, usually acute, coarsely serrate, dull and glabrous above, paler and finely pubescent beneath; stipules dilated: fls. solitary or few, pink, 5–6 cm. across; pedicels and receptacle smooth: fr. subglobose, about 1.2 cm. across, sometimes ellipsoid. Fl.V–VI. W.R.307,t(c). Miller & Whiting, Wild Fl. 152. B.B.2:283. (*R. Solandri* Tratt., *R. virginiana* Koehne, not Mill.) Nfdl. to Pa., Mo., N. D. and Man. Intr. 1773. Zone II?—Var. **glabra** Crép. Lfts. glabrous beneath. (*R. subblanda* Rydb.)

R. b. × *chinensis* = **R. Aschersoniàna** Graebn. Stems with hooked prickles. fls. very numerous, small, bright light purple; styles usually exserted. Gt.51:t. 1504,f.1(c). Orig. about 1880.—*R. b.* × *rugosa* = *R. warleyensis;* see under No. 40.

45. **R. pendulìna** L. Stems slender, to 1 m., usually nearly unarmed, rarely bristly and prickly: lfts. 7–9, rarely 11, oblong-ovate or oblong-elliptic, 2–6 cm. long, obtuse, doubly glandular-serrate, glabrous or pubescent on both sides, more densely so beneath; stipules dilated: fls. usually solitary or 2–5, about 4 cm. across, rose or purple; pedicels and receptacle smooth or glandular-bristly: fr. oblong, with neck, usually nodding, 2–2.5 cm. long, bright red. Fl.V–VI. B.R.424(c). W.R.2:293,t(c). F.D.25:t.2625(c). (*R. alpina* L., *R. cinnamomea* L. 1753, not 1759.) Mts. of S. and C. Eu. Cult. 1789.—Var. **pyrenáica** R. Kell. Dwarf with glaucous brts. and glandular-bristly pedicels and receptacle. B.M.6724(c). G.H.t.93(c). Gn.27:t.544. (*R. p.* Gouan.) Cult. 1815.—Handsome Rose with conspicuous large fr.

R. p. × *chinensis* = **R. Lheritieràna** Thory. Boursault R. Climbing to 4 m., sparingly prickly: lfts. 3–7, oblong-ovate, simply serrate, glabrous: fls. in corymbs, light or dark purple, double or semidouble: fr. subglobose, smooth. R.R.3:gr.26,3. W.R.301,t(c). (*R. reclinata* Thory, *R. Boursaultii* Hort.) Orig. before 1820.—*R. p.* × *spinosissima* = *R. reversa;* see under No. 62.

46. **R. cinnamòmea** L. Cinnamon R. Shrub to 2 m.; stems slender with short curved prickles, often unarmed: lfts. 5–7, rarely 3, elliptic to oblong, obtuse or short-acuminate, 1.5–4 cm. long, simply serrate, dull green and pubescent above, densely pubescent beneath: stipules dilated, more or less convolute: fls. solitary or few, purple, about 5 cm. across; pedicels 2–3 cm. long, like the receptacle smooth: fr. depressed-globose, 1.2–1.5 cm. thick, scarlet. Fl.V–VI. W.R.141,t(c). D.F.25:t.2626(c). A.G.13:343. (*R. spinosissima* L. partly.) Eu., N. and W. Asia. Cult. 1596. Zone IV.—Var. **plèna** West. With double fls. W.R.143,t(c). R.R.1:gr.9,1(c). B.C.5:2993. (*R. majalis* Herrm., *R. foecundissima* Muenchh.) Cult. before 1770. Sometimes escaped in the E. States.

R. c. × *gallica* = *R. francofurtana* Muenchh.; see under No. 22.

Closely related species are: **R. davùrica** Pall. Prickles straight and slender

lfts. smaller, doubly serrate; stipules narrow: pedicels longer, glandular: fr. ovoid. N.K.7:t.9. S.H.1:f.327c,328b-b¹. (*R. cinnamomea* var. *d.* C. A. Mey.) N. China, N. E. Asia. Intr. 1910. Zone V.—**R. laxa** Retz. Prickles hooked or straight: lfts. 7–9, glabrous or pubescent beneath: fls. several, white; pedicels glandular: fr. ovoid. S.H.1:f.325l-l². Turkest., Song. Cult. about 1800.—**R. amblyôtis** C. A. Mey. Prickles slender, straight, pointing upward; lfts. rarely 9, elliptic-oblong or oblong-ovate, 3–5 cm. long, usually acute, sharply serrate, puberulous beneath at least on midrib: pedicels slender, to 2 cm. long, glabrous; fls. 5 cm. across, red; sepals caudate: fr. depressed-globose or pyriform. Kamchatka. Cult. 1917. Zone II?—**R. Marrétii** Lév. Brts. dark purple; prickles slender, straight: lfts. usually 7, oblong, 2–4 cm. long, obtusish to acute, thinly pubescent beneath: fls. 1–3, pink; pedicels and calyx-tube smooth; sepals caudate, entire, stipitate-glandular on back: fr. subglobose, W.R.2:495,t. Saghalin. Cult. 1908. Zone II?

47. **R. pisocârpa** A. Gr. Shrub to 2 m.; stems slender, with weak slender usually ascending prickles 2–5 mm. long: lfts. 5–7, elliptic-oblong to oblong-obovate, 1–4 cm. long, acutish or obtuse, coarsely serrate, green and finely pubescent beneath, short-petioluled; upper stipules dilated, slightly glandular-dentate: fls. corymbose with leafy bracts, pink, about 3 cm. across; sepals glandular-hispid on back: fr. globose, sometimes with short neck, 8 mm. across. Fl.VI–VIII. B.M.6857(c). W.R.227,t(c). B. C. to Calif. and Idaho. Intr. about 1882. Zone V.

48. **R. Woòdsii** Lindl. Shrub to 2 m.; stem with numerous straight or slightly curved prickles: lfts. 5–7, obovate to oblong-obovate, petioluled, 1–3 cm. long, simply serrate, glaucous and glabrous or nearly glabrous beneath; stipules entire or slightly toothed, like the petiole usually glandless, rather narrow: fls. 1–3, pink, rarely white, 3–4.5 cm. across; pedicels and receptacle glabrous: fr. globose, rarely ellipsoid and with distinct neck, 8–10 mm. thick. Fl.VI–VIII. W.R.236,t(c). (*R. Maximiliani* Nees, *R. Sandbergii* Greene.) Sask. and B. C. to Kans. and Utah. Cult. 1880. Zone V.—Var. **Féndleri** Rydb. Lower, with straight slender prickles; stipules and petioles glandular; lfts. usually doubly glandular-serrate. W.R.175,t.(c),177,t. B.B.2:f.2311 (as *R. Woodsii*). (*R. F.* Crép.) B. C. and Minn. to Ariz. and Chihuahua. Cult. 1888.

A closely related species is **R. Macoùnii** Greene. Stems with straight prickles, bristly when young: lfts. obovate, pale or glaucous and finely puberulent beneath. B.R.926(c, as *R. Woodsii*). (*R. Woodsii* Lindl. 1826, not 1820.) B. C. to Sask., Ore., Neb. and W. Tex. Intr. before 1826.

49. **R. californica** Cham. & Schlecht. Shrub to 3 m., with stout flattened, recurved prickles 5–8 mm. long; young shoots sometimes bristly; flowering brts. usually prickly: lfts. 5–7, broad-elliptic to oblong-obovate, 1–3 cm. long, usually obtuse, usually simply serrate, not glandular, dull and appressed-pubescent above, villous beneath: fls. in leafy-bracted corymbs, pink, about 4 cm. across; pedicels glabrous or slightly villous: fr. globose, with a distinct neck, 1–1.5 cm. across. Fl.VI–VIII. Armstrong, Field Book Wild Fl. 221,f. Ore. to L. Calif. Cult. 1878. Zone V.—Var. **plèna** Rehd. With double or semidouble fls. W.R.223,t(c). (Var. *fl. pleno* Bean.)—Var. **nàna** Bean. A dwarf form.

R. c. × *nitida* = *R. Scharnkeana;* see under No. 38.

50. **R. nutkàna** Presl. Shrub to 1.5 m.; stems usually dark brown, upright, with rather large straight prickles; young stems sometimes bristly: lfts. 5–9, broad-elliptic or oblong-ovate, 1.5–5 cm. long, acute or obtuse, doubly glandular-serrate, dark green and glabrous above, somewhat glandular-puberulous beneath, rarely slightly pubescent on veins; upper stipules dilated, glandular-dentate, glabrous; fls. usually solitary, 5–6 cm. across, rose, rarely white; pedicels 2–3 cm. long, usually slightly glandular-hispid; receptacle glabrous: fr. globose, without neck, 1.5–1.8 cm. across. Fl.VI–VII. W.R.

231,t(c). G.F.1:449. B.C.5:2993. Alaska to Wyo. and Calif. Intr. about 1876. Zone V.—Var. **hispida** Fern. Lfts. coarsely serrate; receptacle glandular-hispid. (*R. MacDougalii* Holz.) B. C. to Utah.

51. **R. corymbulòsa** Rolfe. Shrub to 2 m.; stems upright or sarmentose: brs. with few slender straight paired prickles or unarmed: lfts. 3–5, ovate-oblong, 2–4 cm. long, acute, finely doubly serrate, dull green and slightly pubescent above at first, glaucescent and pubescent beneath; rachis puberulous and sparingly glandular; stipules narrow and glandular-ciliate: fls. red with white eye, 2–2.5 cm. across, in umbel-like many-fld. corymbs; pedicels slender, about 2 cm. long, like the receptacle glandular-bristly; styles pubescent forming a column about 4 mm. long; fr. subglobose or ovoid 1–1.3 cm. long, scarlet. B.M.8566(c). G.C.III.79:23. W. China. Intr. 1908. Zone V. —Handsome Rose with small numerous fls.

52. **R. Davìdi** Crép. Shrub to 3 m.; stems with straight stout scattered prickles 4–6 mm. long, much enlarged at base: lfts. 7–9, rarely 11, elliptic to ovate-oblong, 2–4, rarely 6 cm. long, simply serrate, glabrous above, glaucescent and puberulous beneath; rachis puberulous, sparingly prickly: fls. pink, 3.5–5 cm. across, corymbose; pedicels like the oblong receptacle glandular-bristly or sometimes only puberulous; styles exserted about 6 mm.: fr. ovoid or oblong-ovoid, 1.5–2 cm. long, with long neck, scarlet. Fl.VI–VII. B.M. 8679(c). G.C.III.78:423. W. China. Intr. 1908. Zone V.—Var. **elongàta** Rehd. & Wils. Lfts. 5–7 cm. long: fls. fewer: fr. 2–2.5 cm. long. Intr. 1908.—Very handsome in fr.

53. **R. caudàta** Bak. Shrub to 4 m.; stems with scattered straight stout prickles to 8 mm. long, broad at base: lfts. 7–9, elliptic-ovate or ovate to oblong-ovate, 2.5–5 cm. long, acute, simply serrate, glabrous and glaucescent beneath; rachis smooth or sparingly prickly and glandular-bristly; stipules rather broad, glandular-ciliate; fls. red, 3.5–5 cm. across, in few-fld. corymbs; pedicels and receptacle glandular-bristly, rarely nearly smooth; sepals entire, long-caudate, with leafy apex: fr. oblong-ovoid, with long neck, 2–2.5 cm. long, orange or coral-red; sepals upright. Fl.VI. W.R.497(fr). W. China. Intr. about 1896. Zone V.

A related species is **R. banksiópsis** Bak. Prickles few or stems unarmed above: lfts. 7–9, oblong, usually pubescent beneath: fls. 2–3 cm. across; pedicels and receptacle glabrous. W.R.505(fr). W. China. Intr. 1907 or 1909.—Another related species is **R. macrophýlla** Lindl. Large shrub, with few prickles or unarmed: lfts. 9–11, elliptic-ovate to elliptic-oblong, 2.5–6 cm. long, acute, pubescent beneath: fls. 1–3, red, about 5 cm. across; pedicels and receptacle glandular-setose or smooth: fr. oblong-ovoid, 2.5–3 cm. long. W.R.157,t(c).159,t. Himal. Intr. 1818. Zone VI or VII.

54. **R. setípoda** Hemsl. & Wils. Shrub to 3 m.; stem with infra-stipular, straight wide-based prickles to 8 mm. long: lfts. 7–9, elliptic or ovate, 3–6 cm. long, obtuse or acutish, usually doubly serrate, dark green and glabrous above, glaucous and usually glandular beneath and puberulous on the veins or sometimes glabrous; stipules broad, densely glandular-ciliate; rachis sparingly prickly and stipitate-glandular: fls. pale pink to rose-purple, about 5 cm. across, in loose corymbs; pedicels and receptacle copiously glandular-setose; sepals long-caudate, with foliaceous serrate tips: fr. oblong-ovoid, with narrow neck, about 2.5 cm. long, deep red. Fl.VI. B.M.8569(c). J.L.27:486. (*R. macrophylla* var. *crasse-aculeata* Vilm.) C. China. Intr. 1895. Zone (V).—Conspicuous in June with its large pink fls. and in autumn with its nodding clusters of red hips.

A related species is **R. persetòsa** Rolfe. Stems densely bristly; lfts. 5–9, 2–5 cm. long, simply serrate, puberulous beneath; rachis puberulous: fls. deep pink, 2–3

cm. across, in large corymbs; pedicels and receptacle glabrous; sepals entire. J.L. 27:487, 488. W. China. Intr. 1895. Zone V.

55. **R. Sweginzówii** Koehne. Shrub to 5 m.; stems with large compressed prickles, sometimes mixed with smaller prickles: lfts. 7–11, elliptic to ovate-oblong, acute, 2–5 cm. long, doubly serrate, glabrous above, pubescent beneath, more densely on the veins; rachis prickly and glandular; stipules wide, glandular-ciliate: fls. 1–3, rose, about 4 cm. across; pedicels and receptacle glandular-hispid; sepals sparsely lobed and serrate at apex: fr. oblong, about 2.5 cm. long, bright red. Fl.vi. M.D.1910:96. S.H.2:f.593f-k. G.C.III.72: 135. Gn.87:588. N. W. China. Cult. 1910. Zone V.

A related species is **R. Murièlae** Rehd. & Wils. Shrub to 2.5 m.; stems with slender prickles and bristles: lfts. 9–15, elliptic to elliptic-oblong, 1–4 cm. long, acutish, pubescent on midrib beneath: fls. white, in 3–7-fld. corymbs; sepals entire: fr. ellipsoid, 1–2 cm. long. W. China. Intr. 1904.

56. **R. Moyèsii** Hemsl. & Wils. Shrub to 3 m.; stems with scattered and paired short straight prickles: lfts. 7–13, ovate or elliptic to oblong-ovate, 1–4 cm. long, acute, closely serrulate, glabrous except pubescent on midrib beneath; rachis puberulous, glandular and bristly; stipules wide, glandular-ciliate: fls. 1–2, deep blood-red, 4–6 cm. across; pedicels short, stipitate-glandular; receptacle stipitate-glandular or smooth; sepals ovate, long-caudate: fr. oblong-ovoid, narrowed into a neck, 5–6 cm. long, deep orange-red. Fl.vi. B.M.8338(c). W.R.229,t(c),230,t. J.L.27:489. B.S.2:435. G.C.III. 70:219. Gn.72:313. S.L.367(h). V.F.95(h). (*R. macrophylla* var. *rubrostaminea* Vilm.) W. China. Intr. 1894 and 1903. Zone (V).—Var. **Fargèsii** Rolfe. Lfts. broad-oval to suborbicular, 1.2–2 cm. long, obtuse. G.C.III. 65:19. Gn.86:543;87:590. (*R. F.* Hort.) Cult. 1900?—Var. **rósea** Rehd. & Wils. Fls. light pink. Intr. 1908.—A very handsome Rose, particularly the type with dark red fls.

A related species is **R. saturàta** Bak. Stems unarmed or with few small prickles: lfts. usually 7, ovate to ovate-lanceolate, 2.5–6 cm. long, acute or short-acuminate, sharply serrate, pubescent on the veins beneath or nearly glabrous: fls. solitary, dark red, 5 cm. across; anthers purple; pedicels glabrous: fr. globose-ovoid, 1.5–2 cm. long, coral-red. C. China. Intr. 1907. Zone (V).

57. **R. bélla** Rehd. & Wils. Shrub to 3 m.; stems with slender straight prickles, bristly near base: lfts. 7–9, elliptic or ovate, 1–2.5 cm. long, acutish, rarely obtusish, simply serrate, glaucescent beneath, glabrous except stipitate-glandular on midrib; upper stipules broad, glandular-ciliate: fls. 1–3, bright rose, 4–5 cm. across; pedicels 5–10 mm. long, like the receptacle stipitate-glandular; sepals caudate, leafy and entire at apex: fr. ellipsoid, attenuate into the neck, 1.5–2 cm. long, scarlet. Fl.vi. N. China. Intr. 1910. Zone V.—Var. **pállens** Rehd. & Wils. Fls. light rose-colored. Intr. 1910.

58. **R. Webbiàna** Wall. Slender shrub to 2 m.; brs. slender, often pruinose when young, with straight yellow prickles about 1 cm. long: lfts. 5–9, orbicular to obovate or broad-elliptic, 6–20 mm. long, rounded at apex, rarely acutish, serrate, entire toward the base, glabrous or sometimes slightly pubescent beneath; petiole prickly: fls. pale pink, 4–5 cm. across; pedicels short, glabrous or slightly glandular; sepals lanceolate, entire, glandular outside: fr. ovoid, 1.5–2 cm. long, bright red. Fl.vi. W.R.223,t(c). Himal. to Afghan. and Turkest. Intr. 1879. Zone (V).

A related species is **R. Fedtschenkoàna** Reg. Stems with prickles and bristles: lfts. 7–9, oblong, 2–3 cm. long, pubescent beneath: fls. 1–4, white; pedicels and receptacle hispid. B.M.7770(c). W.R.155,t(c). Turkest. Intr. 1876?

59. **R. sertàta** Rolfe. Slender shrub to 2 m.; brs. glaucous, with straight slender prickles: lfts. 7–11, narrow-elliptic to oblong, 6–20 mm. long, sharply serrate, glabrous, glaucescent beneath; stipules glandular-ciliate: fls. 1 or few,

rose or rose-purple, 5–6 cm. across; pedicels 1.5–3 cm. long; glandular or glabrous; sepals caudate, entire: fr. ovoid, 1.5–2 cm. long, deep red. Fl.vi. B.M.8473(c). W.R.153,t(c). G.C.III.54:166. C. China. Intr. 1904. Zone V.—**Handsome graceful Rose.**

Related species are: **R. Giráldii** Crép. Brts. with slender prickles: lfts. usually 7, suborbicular to ovate or elliptic, serrate, pubescent: fls. pink, 2.5 cm. across: fr. ovoid, about 1 cm. long, scarlet. C. China. Intr. ?1897.—Var. **venulôsa** Rehd. & Wils. Lfts. firmer, reticulate beneath, often glabrous or nearly glabrous above. Intr. 1907. Zone V?—**R. Prâttii** Hemsl. Stems prickly and bristly or without bristles; lfts. 7–15, elliptic to oblong, 6–15 mm. long, obtusish, serrate, pubescent on the veins beneath; rachis puberulous: fls. 1 or several, 2 cm. across, pink, sepals ovate, abruptly acuminate; pedicels and receptacle glandular-bristly: fr. subglobose to ovoid, 6–10 mm. long; sepals finally deciduous. W. China. Intr. 1903 or 1908. Zone V.

60. **R. multibracteàta** Hemsl. & Wils. Shrub to 2 m.; brts. slender, glabrous, with slender straight paired prickles: lfts. 7–9, broad-oval to suborbicular, 6–15 mm. long, obtuse, doubly serrulate, glabrous or pubescent on midrib beneath; rachis glandular and often with few small prickles: fls. pink, 3 cm. across, in corymbs with many crowded bracts, sometimes few or solitary; pedicels and receptacle glandular-bristly; sepals ovate, abruptly acuminate, entire; styles villous, exserted about 4 mm.: fr. ovoid, 1–1.5 cm. long, orange-red. Fl.vi. W.R.491,t. (form with few-fld. infl.) (*R. reducta* Bak.) W. China. Intr. 1910. Zone VI.

61. **R. Willmôttiae** Hemsl. Densely branched shrub to 3 m.; stems with straight paired prickles, glaucous when young: lfts. 7–9, elliptic to obovate or nearly orbicular, 6–15 mm. long, usually rounded at apex, closely and often doubly serrate, glabrous: fls. usually solitary, rose-purple, about 3 cm. across; pedicels about 1 cm. long, glabrous; sepals lanceolate, caudate, smooth: fr. subglobose, about 1 cm. long, orange-red. Fl.vi. B.M.8086(c). Gn.87: 588. S.L.369(h). W. China. Intr. 1904. Zone V?

62. **R. gymnocàrpa** Nutt. Shrub to 3 m.; stems with paired very slender prickles and bristles: lfts. 5–9, broad-elliptic to elliptic-oblong, 1–3.5 cm. long, doubly glandular-serrate, glabrous; stipules glandular-ciliate and dentate: fls. usually solitary, rose, about 3 cm. across; pedicels glabrous or glandular-hispid: fr. ellipsoid or subglobose, 6–8 mm. across. Fl.vi–vii. W.R.221,t(c). Armstrong, Field Book Wild Fl. 223,f. B. C. to Calif. and Mont. Intr. 1893. Zone V.

A related species is **R. Albérti** Reg. Shrub to 1 m.; stems densely prickly and bristly: lfts. orbicular to obovate or ovate, 6–30 mm. long, often doubly serrate, appressed-pubescent beneath: fls. white, about 3 cm. across; pedicels glandular; receptacle smooth: fr. pear-shaped, 1.5–2 cm. long. Turkest. Intr. 1877. Zone V.

63. **R. Beggeriàna** Schrenk. Much-branched shrub to 2.5 m.; stems with hooked paired and scattered prickles: lfts. 5–9, oval or elliptic-obovate, 8–25 mm. long, simply serrate, pubescent beneath or glabrous, bluish or grayish green; fls. in several- or many-fld. corymbs, rarely solitary, white, rarely pink, 2–3 cm. across; pedicels and receptacle glandular or smooth; fr. subglobose, 6–8 mm. across, red, finally dark purple. W.R.171,t(c). I.T.5:t.122. SH.1:f.325i-k[1], 326k-l. N. Persia to Altai and Song. Intr. 1881. Zone V or IV.

Sect. 11. Pimpinellifoliae DC. Usually low shrubs; stems usually with straight prickles and bristles: lfts. small, 7–9; stipules narrow, with divergent and dilated auricles: fls. solitary, without bracts; sepals entire, erect and persistent. Eu. and Asia.

64. **R. spinosíssima** L. Burnet R. (Scotch R.) Low shrub, rarely exceeding 1 m., with spreading or recurving brs.; brts. usually densely prickly

and bristly: lfts. 5–11, usually 7–9, orbicular to oblong-ovate, 1–2 cm. long, simply serrate, or doubly glandular-serrate, glabrous, sometimes glandular beneath; stipules entire, rarely glandular-dentate: fls. solitary, but usually very numerous on short brts. along the stems, pink, white or yellow, 2–5 cm. across; pedicels usually glandular-hispid: fr. subglose, black or dark brown, 1–1.5 cm. across. Fl.v–vi; fr.ix. W.R.247,t(c). B.R.431(c). F.D.25:t. 2623(c). Gn.60:24;74:598;86:306. G.C.III.70:218. (*R. pimpinellifolia* L., *R. illinoensis* Bak.) Eu., W. Asia. Cult. before 1600. Zone V.—A very variable species: Var. **pimpinellifòlia** Hook. Pedicels smooth.—Var. **altáica** Rehd. More vigorous, less bristly: fls. large, white; pedicels glabrous. W.R 257,t(c). B.R.888(c). Gn.53:t.170(c). Gng.5:307(h). W.A.104,t(h). (*R. a.* Willd., *R. grandiflora* Lindl.)—Var. **myriacántha** Koehne. Brts. very prickly: lfts. doubly glandular-serrate, very small: fls. small, white, blushed. W.R. 261,t(c). R.R.1,gr.6,7.—Var. **inérmis** Rehd. Brts. almost unarmed: fls. pink. R.R.1:gr.6,6. (Var. *mitissima* Koehne, *R. pimpinellifolia* var. *i.* DC.)—Var. **macracántha** Bean. With flat rigid, wide-based prickles to 1.5 cm. long. S. E. France.—Var. **Andrèwsii** Willm. With double red fls. W.R.263,t(c).—Var. **nàna** Andrews. With double white fls. Andrews, Roses, 122(c).—Var. **híspida** Koehne. Upright shrub to 2 m.: lfts. usually simply serrate; pedicels smooth: fls. sulphur-yellow, 6–7 cm. across. B.M.1570(c). W.R.259,t(c). Gn.56,t.398(c);62:17. J.L.27:508. (*R. h.* Sims, *R. lutescens* Pursh.)—Var. **lutéola** Andr. Similar to the preceding var.: lfts. 7: fls. pale yellow, about 5 cm. across. W.R.255,t(c). G.28:281. (*R. ochroleuca* Swartz.)—Var. **lùtea** Bean. About 1 m. tall: lfts. broad-oval, to 2.5 cm. long, pubescent beneath: fls. bright yellow. Orig. unknown, possibly a hybrid.

R. s. × *canina* = **R. hibérnica** Smith. Shrub to 3 m., with upright or arching stems, bristly and prickly: lfts. 5–9, bluish green, pubescent beneath: fls. usually 3, pink, about 3 cm. across; sepals lobed: fr. globose, red. W.R.289,t(c). Intr. 1802.—*R. s.* × *pendulina* = **R. revérsa** Waldst. & Kit. Shrub to 1.5 m.; stems upright, with slender prickles and bristles: lfts. 5–9, 6–20 mm. long, dark green: fls. solitary, red, 4–5 cm. across; pedicels glandular-bristly: fr. ovoid, 2 cm. long, pendulous, red. F.D.25:t.2624(c). (*R. rubella* Sm.) Eu. Cult. 1820.—Possibly of similar parentage is **R. Màlyi** Kern. Shrub to 2 m.: lfts. oval or suborbicular, 1.5–3 cm. long, usually doubly serrate, glabrous: fls. usually solitary, deep red, 3–4 cm. across: fr. oblong-ovoid. W.R.297,t(c). (*R. pendulina* var. *M.* Kern.) Dalmatia. Cult. 1902.—*R. s.* × *?tomentosa* = **R. involùta** Smith. Shrub to 3 m.; stems with prickles and bristles: lfts. 5–9, elliptic, simply or doubly glandular-serrate, pubescent beneath: fls. pink or whitish, solitary: fr. globose, red. W.R. 281,t(c). Orig. in Scotland.—*R. s.* × *carolina* = **R. Kochiàna** Koehne. Brts. densely bristly: lfts. 9–11, small: fls. 1–3, deep rose. (*R. oxyacantha* K. Koch, not Bieb.) Orig. before 1870.—*R. s.* × *foetida* = *R. Harisonii;* see under No. 69.

A related species is **R. koreàna** Komar. Dense shrub to 1 m.: brts. densely bristly, dark red: lfts. 7–11, elliptic to obovate-elliptic, 1–2 cm. long, obtusish, sharply glandular-serrate, glabrous or slightly pubescent beneath: fls. 2.5–3 cm. across, white, flushed pink; pedicels stipitate-glandular; fr. ovoid, 1–1.5 cm. long, orange-red. N.K.7:t.14. Act. Hort. Petrop.22:t.11. Korea. Intr. 1917.

65. **R. Hugònis** Hemsl. Shrub to 2.5 m., with arching brs.; prickles straight, compressed, mixed on the shoots with bristles: lfts. 5–13, oval to obovate or elliptic, 8–20 mm. long, obtuse, sometimes acutish, finely serrate, glabrous or slightly villous on the veins when unfolding: fls. solitary on short brts., light yellow, 5 cm. across; pedicels 1.5–2 cm. long, like the receptacle glabrous: fr. depressed-globose, about 1.5 cm. across, deep scarlet. Fl.v–vi; fr. vii–viii. B.M.8004(c). W.R.279,t(c). B.S.2:429. Gn.87:589. Gn.M.31: 373(h);38:37(h). C. China. Intr. 1899. Zone V.—A very handsome free-flowering and early Rose, one of the best single yellows.

66. **R. xánthina** Lindl. Shrub to 3 m.; brts. brown with stout and straight

prickles, even shoots without bristles: lfts. 7–13, broad-oval or nearly suborbicular, rarely elliptic, 8–20 mm. long, obtuse, serrate, glabrous above, slightly villous beneath, at least when young: fls. solitary, yellow, double or semidouble, 4 cm. across. Fl.v–vi; fr.vii–viii. N.K.7:t.6. (*R. xanthinoides* Nakai.) Cult. in N. China, Korea. Intr. 1906. Zone V.—Var. **spontànea** Rehd. Fls. single. The wild form. Franchet, Pl. David.1:t.15. N. China, Korea. Intr. 1906. Zone V.

67. **R. Ècae** Aitch. Upright shrub to 2 m.; brs. slender with numerous stout wide-based straight prickles: lfts. 7–15, elliptic or elliptic-obovate to elliptic-oblong, 6–20 mm. long, acute or obtuse, minutely and doubly glandular-serrulate, glabrous, glandular beneath: fls. solitary, 2.5 cm. across, pale yellow or yellowish white; pedicels short, smooth: fr. globose or obovoid, red like its stalk, about 1 cm. long, with reflexed sepals. Fl.v–vi; fr.vii, soon dropping. B.M.7666(c). W.R.277,t(c). (*R. xanthina* Auth., not Lindl.) Afghan., Turkest. to N. China. Intr. 1880. Zone V.—Handsome shrub valued for its early fls. and strongly aromatic young foliage.

Sect. 12. Luteae Crép. Upright or somewhat sarmentose shrubs with scattered straight or hooked prickles, without bristles; stipules usually narrow with divergent and dilated auricles: fls. yellow, without bracts; sepals lobed, persistent. Two Asiatic species.

68. **R. hemisphaèrica** Herrm. Sulphur R. Shrub to 3 or 4 m.; stems slender, often sarmentose, with hooked prickles: lfts. 5–9, obovate, 1–3.5 cm. long, rounded at apex, cuneate, coarsely toothed, bluish green, glaucescent beneath and pubescent; rachis pubescent, sparingly glandular: fls. double, scentless, light yellow, 5 cm. across; pedicels glabrous or glandular-hispid; sepals with leafy toothed apex. Fl.vi. W.R.273,t(c). B.R.46(c). (*R. sulphurea* Ait., *R. glaucophylla* Ehrh.) W. Asia. Intr. before 1625. Zone VI?—The wild form (*R. Rapinii* Boiss.) with single yellow flowers and globose fr. is not in cult.

69. **R. foètida** Herrm. Austrian Brier. Shrub to 3 m.; stems slender, often sarmentose, brown, with straight prickles: lfts. 5–9, broad-oval or obovate, 1.5–4 cm. long, doubly glandular-serrate, dark green above, glandular and pubescent beneath; stipules glandular-serrate: fls. solitary or sometimes several, deep yellow, 5–7 cm. across, of unpleasant odor; pedicels and receptacle smooth; sepals leafy at tip: fr. globose, red. Fl.vi. B.M.363(c). W.R.267,t(c). F.D.25:t.2622(c). Gn.53:22,t(c). (*R. lutea* Mill., *R. Eglanteria* Mill., not L.) W. Asia. Intr. before 1600. Zone V.—Var. **bícolor** Willm. Austrian Copper Brier. Fls. orange-scarlet or coppery-red inside. B.M. 1077(c). W.R.269,t(c). Gn.53:23;55:425. (*R. lutea punicea* Aschers. & Graebn., *R. punicea* Mill., *R. b.* Jacq.) Intr. before 1590.—Var. **persiàna** Rehd. Persian Yellow. With double fls. F.S.4:t.374(c). More floriferous than the double Sulphur Rose and fls. smaller, but more double. Intr. 1838.

R. f. × *spinosissima* = **R. Harisònii** Rivers. Harison's Yellow R. Lower, with shorter brs.: fls. paler and less double than Persian Yellow; pedicels and receptacle bristly: fr. nearly black. S.B.II.4:410(c). F.E.18:6. H.B.5:t.99(c). (*R. foetida* var. *H.* Rehd., *R. lutea* var. *Hoggii* Sweet.) Orig. about 1830. Hardier than Persian Yellow.—*R. f.* × *eglanteria* = **R. Penzanceàna** Rehd. Lady Penzance R. Low shrub with arching brs. and hooked prickles: lfts. 7, fragrant: fls. pink with yellow eye. Orig. about 1890.

Sect. 13. Sericeae Crép. Upright shrubs; with infrastipular prickles; stipules narrow with erect dilated auricles: lfts. 5–17, small: fls. solitary, without bracts; petals usually 4; styles somewhat exserted; sepals entire, erect, persistent. Three Asiatic species.

70. **R. omeiénsis** Rolfe. Shrub to 3 or 4 m.; stems upright, with flattened wide-based prickles, young shoots often bristly: lfts. 9–17, oblong or elliptic-

oblong, 8–30 mm. long, acutish, cuneate, serrate, glabrous or puberulous on midrib beneath; petioles puberulous and prickly: fls. white, 2.5–3.5 cm. across; pedicels and receptacle smooth: fr. pear-shaped, 8–15 mm. long, bright red, on a thickened yellow stalk of about equal length. Fl.v–vi; fr. vii. B.M.8471(c). B.C.5:2996. W. China. Intr. 1901. Zone VI.—Var. **pteracántha** Rehd. & Wils. Prickles much enlarged at base, decurrent and often confluent, forming wide wings, red and translucent when young. B.M. 8218(c). Gn.69:300,t(c). G.C.III.38:260. J.L.27:491. V.F.99(h). (*R. sericea* var. *p.* Fr.) Intr. 1890.—A very distinct and handsome shrub with finely divided fernlike foliage; coloring of fr. unique; the stems of the var. conspicuous in winter.

A closely related species is **R. serícea** Lindl. Lfts. 7–11, oval or obovate, 1–2 cm. long, silky-pubescent beneath: fr. red, on a slender, not thickened stalk. B.M.5200(c). W.R.163,t(c). R.H.1897:444, 445. Himal. Intr. 1822. Zone VII?

Sect. 14. Minutifoliae Crép. Low shrubs, with slender straight or slightly curved scattered prickles: lfts. 3–7, small, incised-serrate; stipules with dilated divergent auricles: fls. solitary, without bracts; sepals lobed, erect, persistent: fr. prickly.

71. **R. stellàta** Woot. Shrub to 0.6 m.; brs. with numerous slender yellowish white prickles and closely stellate-pubescent when young: lfts. 3, sometimes 5, broad-cuneate-obovate, 5–10 mm. long, incisely dentate, pubescent on both sides: fls. solitary, deep rose-purple, 3.5–5.5 cm. across: fr. broad-turbinate, 1–1.5 cm. across, dull reddish. Fl.vi–viii. W.R.305,t(c). J.L.27: 456. Bull. Torr. Bot. Club, 25:t.335,f.1–5,9. W. Tex. to Ariz. Intr. 1902. Zone (V).—Var. **mirífica** Cock. More vigorous, to 1.2 m. high; brts. without stellate pubescence: lfts. usually 5, sometimes nearly glabrous: fls. 3.5–6 cm. across. B.M.9070(c). (*R. m.* Greene.) N. Mex. Intr. 1916. Zone (V).

A related species is **R. minutifòlia** Engelm. Brts. pubescent, with slender brown prickles: lfts. 5–7, ovate to elliptic, 3–10 mm. long, pubescent: fls. pink or white, 2.5 cm. across. G.F.1:102. B.C.5:2996. J.L.27:456. L. Calif. Cult. 1910. Zone VII?

Sect. 15. Microphyllae. Much-branched shrub with straight infra-stipular prickles: lfts. 7–15; stipules very narrow with subulate divergent auricles: fls. 1 or few, with small, quickly caducous bracts; sepals broad, erect and persistent, the outer ones lobed: achenes only at bottom of the prickly receptacle.

72. **R. Roxbúrghii** Tratt. Spreading shrub to 2.5 m.; bark gray, peeling: lfts. elliptic to elliptic-oblong, 1–2 cm. long, acute, sharply serrate, glabrous beneath: fls. pale pink, 5–6 cm. across; pedicels and receptacle prickly: fr. depressed-globose, 3–4 cm. across, very prickly. (*R. microphylla* Roxb., not Desf.) China, Japan.—Var. **plèna** Rehd. With double fls. Fl.vi. B.R.919(c). B.M.3490(c). W.R.135,t(c). Gn.81:484, 548;83:510. S.L.370(h). Intr. 1828. Zone VI? The type of the species.—Var. **normàlis** Rehd. & Wils. The wild form with single fls. China. Intr. 1908.—Var. **hirsùta** Rehd. & Wils. Lfts. elliptic to ovate-oblong, 1–2.5 cm. long, pubescent beneath. B.M.6548(c). Japan. Intr. before 1880.

R. R. × *rugosa* = *R. micrugosa*, see under No. 40.

Subfam. IV. Prunoideae Focke. Trees or shrubs, sometimes spiny: lvs. simple, stipulate: fls. white to pink, solitary, umbellate or racemose; petals rarely wanting; stamens 10 to many; carpels usually 1, rarely 2–5, free, 2-ovuled, developing into a 1-, rarely 2-seeded drupe sometimes dehiscent; stone with usually bony endocarp. (*Drupaceae* DC., *Amygdalaceae* Reichenb.)

45. **MADDÈNIA** Hook. f. & Thoms. Deciduous trees or shrubs; winter-buds with many scales; lvs. alternate, serrate, stipulate: fls. appearing with the lvs., dioecious, apetalous, short-pediceled, in racemes; sepals 10, very small; stamens 25–40; pistil with a long style and 2 ovules; in the staminate

fl. sometimes 2 abortive pistils with sessile stigmas: fr. a 1-seeded drupe. (After Major E. Madden, a writer on Indian botany.) Five species in Himal., C. and W. China.

M. hypoleùca Koehne. Shrub or small tree to 6 m.; young brts. glabrous or sparingly pubescent: lvs. ovate-oblong to oblong, 4–6.5, on shoots to 16 cm. long, acuminate, rounded or subcordate at base, doubly serrate with acuminate teeth, glabrous, glaucous beneath, with 14–18 pairs of veins: racemes dense, 3–5 cm. long on leafy peduncles; calyx-tube 4 mm. long; sepals slightly shorter, unequal; stamens to 6 mm. long; style exserted: drupe black, ellipsoid, about 8 mm. long. Fl.IV–V; fr.VI. C. China. Intr. 1907. Zone (V).—The shrub has no particular ornamental qualities.—None of the other species seems to be in cult.

46. **PRÙNUS** L. Deciduous or evergreen trees or shrubs; winter-buds with many imbricate scales: lvs. alternate, serrate, rarely entire, stipulate: fls. perfect, solitary or in fascicles or racemes; sepals 5; petals 5, usually white, sometimes pink or red; stamens numerous, perigynous; pistil 1, with elongated style, 2-ovuled: fr. a drupe, usually 1-seeded. (Ancient Latin name.) Nearly 200 species, mostly in the temperate zone, a few in the Andes of S. Am.—Many species are in cult. for their edible fr. and a few for their edible seeds; a large number are highly ornamental on account of their showy fls. appearing before or with the lvs.

Fr. sulcate, usually bloomy, sometimes pubescent: lvs. sometimes convolute.

A. Axillary buds solitary; terminal bud wanting.....Subgen. I. PRUNOPHORA
B. Ovary and fr. glabrous; fls. pedicelled.
C. Fls. 1–2, rarely 3; stone often sculptured: lvs. convolute.....Sect. 1. EUPRUNUS
CC. Fls. 3 or more, rarely solitary; stone usually smooth: lvs. conduplicate, rarely convolute.....Sect. 2. PRUNOCERASUS
BB. Ovary and fr. pubescent (glabrous in *P. brigantiaca*): fls. sessile (stalked in *P. dasycarpa*): lvs. convolute.....Sect. 3. ARMENIACA
AA. Axillary buds 3, the lateral ones fl.-buds; terminal bud present: fls. 1–2, sessile, rarely stalked: ovary and fr. pubescent, very rarely glabrous: lvs. conduplicate.
Subgen. II. AMYGDALUS

Fr. not sulcate, not bloomy; stone turgid, or subglobose; lvs. conduplicate: terminal bud present.

A. Fls. solitary or few, sometimes in short, few-fld. racemes, usually with conspicuous bracts.
Subgen. III. CERASUS
B. Buds 3 in each leaf-axil: pedicels usually short.....Sect. 1. MICROCERASUS
BB. Buds solitary.
C. Sepals upright or spreading: lvs. with sharp teeth.....Sect. 2. PSEUDOCERASUS
CC. Sepals reflexed.
D. Petals emarginate: lvs. with sharp teeth.....Sect. 3. LOBOPETALUM
DD. Petals not emarginate.
E. Involucre persistent; fls. in umbels: lvs. with short obtuse teeth.
Sect. 4. EUCERASUS
EE. Involucre deciduous; fls. often racemose.
F. Bracts small, deciduous; sepals shorter than tube, entire: lvs. with obtuse teeth.....Sect. 5. MAHALEB
FF. Bracts leafy persistent: lvs. with sharp teeth.
G. Fls. 2–3.....Sect. 6. PHYLLOCERASUS
GG. Fls. 5–6, racemose.....Sect. 7. PHYLLOMAHALEB
AA. Fls. in elongated racemes of 12 or more fls.; bracts small.
B. Lvs. deciduous; peduncle usually leafy.....Subgen. IV. PADUS
BB. Lvs. persistent: peduncle leafless.....Subgen. V. LAUROCERASUS

SUBGEN. I. PRUNOPHORA

Sect. 1. EUPRUNUS

Young brts. tomentose or pubescent; pedicels usually pubescent (glabrous in No. 1): **fr. subglobose.**

A. Fls. usually solitary: fr. upright; stone more or less pitted.....1. *P. spinosa*
AA. Fls. usually 2; stone nearly smooth: fr. pendulous.....2. *P. insititia*

Young brts. glabrous or glabrescent; pedicels glabrous, rarely pubescent.

A. Fr. subglobose to oblong; lvs. spreading or drooping; veins diverging at an angle of about 45°.

B. Lvs. pubescent beneath, to 10 cm. long: fr. generally ellipsoid, usually bluish black. 3. *P. domestica*
BB. Lvs. glabrous beneath except along the midrib: fr. usually subglobose, yellow or red.
C. Fls. usually solitary: lvs. 2–7 cm. long....4. *P. cerasifera*
CC. Fls. usually 3: lvs. oblong-obovate, 6–10 cm. long....5. *P. salicina*
AA. Fr. depressed-globose, very short-stalked: lvs. upright, narrow, with few veins diverging at a very acute angle....6. *P. Simonii*

2. Prunocerasus

Lvs. round-ovate, obtuse or obtusish, incisely serrate, convolute in bud....7. *P. subcordata*
Lvs. ovate to lanceolate, conduplicate in bud (convolute in No. 18, 19, slightly so in 9 and 17)
A. Lvs. with acute or acuminate teeth, dull above, usually pubescent.
B. Lvs. acute or gradually acuminate: brts. usually pubescent: calyx-lobes eglandular: fr. subglobose, usually dark purple, rarely yellow, 1–2 cm. across.
C. Lvs. acute or obtusish, ovate to elliptic; petioles often glandular: low shrub. 8. *P. maritima*
CC. Lvs. acuminate, elliptic to elliptic-oblong; petioles eglandular: trees, sometimes shrubby.
D. Calyx glabrous or puberulous outside; petals white: petioles 5–9 mm. long. 9. *P. umbellata*
DD. Calyx pubescent or puberulous outside; petals turning pink; petioles 7–12 mm. long....10. *P. alleghaniensis*
BB. Lvs. abruptly acuminate, usually obovate-oblong: fr. red or yellow, 2–3 cm. across: trees.
C. Lvs. pubescent beneath and young brts. usually pubescent.
D. Lvs. usually rounded or subcordate at base, thickish at maturity; petiole usually glandular at apex: not sprouting from the root....11. *P. mexicana*
DD. Lvs. usually cuneate, rather thin; petiole usually eglandular: sprouting from the root....12. *P. lanata*
CC. Lvs. glabrous or nearly so and young brts. glabrous: sprouting from the root. 13. *P. americana*
AA. Lvs. with obtuse or obtusish teeth (sometimes acute in *P. orthosepala*, under No. 18); calyx-lobes usually glandular: fr. red or yellow.
B. Lvs. elliptic or slightly obovate, 8–12 cm. long, coarsely or often doubly serrate, usually pubescent beneath: calyx and pedicel reddish; petals fading to pink: fr. 2.5–3 cm. across. 14. *P. nigra*
BB. Lvs. ovate to lanceolate, rarely obovate-oblong, lustrous above, usually finely crenate-serrate, usually smaller: calyx and pedicels green; petals white.
C. Lvs. 6–11 cm. long, pubescent along the midrib below: fr. 2–3 cm. across.
D. Lvs. oblong-obovate or elliptic-oblong, obtusely serrate, rather thick. 15. *P. hortulana*
DD. Lvs. usually oblong-lanceolate, finely glandular-serrate, rather thin. 16. *P. Munsoniana*
CC. Lvs. 2–7 cm. long: fr. smaller.
D. Young brts. glabrous: lvs. glabrous below, trough-shaped, lanceolate or lance-ovate.
E. Calyx-lobes usually pubescent within: lvs. usually ovate-lanceolate and acuminate....17. *P. Reverchonii*
EE. Calyx-lobes glabrous within except at base or sparsely pubescent: lvs. usually elliptic-lanceolate, acute....18. *P. angustifolia*
DD. Young brts. pubescent: lvs. oval or ovate, pubescent below....19. *P. gracilis*

Sect. 3. Armeniaca

Fr. yellow or red: fls. short-stalked.
A. Lvs. rather sharply and nearly doubly serrate, the teeth longer than broad.
B. Ovary and fr. glabrous; pedicels glabrous, about as long as calyx-tube 20. *P. brigantiaca*
BB. Ovary and fr. pubescent; pedicel shorter....21. *P. mandshurica*
AA. Lvs. finely and simply serrate: fls. subsessile.
B. Stone smooth: lvs. usually rounded at base.
C. Lvs. ovate, long-acuminate: fr. about 2 cm. across....22. *P. sibirica*
CC. Lvs. round-ovate, short-acuminate: fr. about 3 cm. across....23. *P. Armeniaca*
BB. Stone pitted: lvs. usually broad-cuneate at base, often pubescent beneath; mature brts. green or greenish, slender....24. *P. mume*
Fr. dark purple: fls. long-stalked....25. *P. dasycarpa*

Subgen. II. AMYGDALUS

Calyx-tube cup-shaped to campanulate, as long or little longer than lobes. (Sect. 1. Euamygdalus Schneid.)
A. Lvs. crenate or closely serrate: sepals erect-spreading: ovary tomentose except in var. of No. 27.
B. Lvs. acuminate, 6–15 cm. long.
C. Stone sulcate and usually pitted.
D. Sepals villous outside, at least on the margin; petiole usually glandular.
E. Fr. becoming dry and splitting at maturity: lvs. serrulate, broadest below the middle; petiole 1.5–2.5 cm. long....26. *P. Amygdalus*
EE. Fr. fleshy, not splitting: lvs. serrate, broadest above the middle; petiole 1–1.5 cm. long....27. *P. Persica*

DD. Sepals quite glabrous; petiole rarely glandular, 1–2 cm. long....28. *P. Davidiana*
CC. Stone smooth, ovate: lvs. lanceolate, villous beneath along the midrib...29. *P. mira*
BB. Lvs. acute or obtusish, 1–3 cm. long: fr. dehiscent; stone rugose....30. *P. dehiscens*
AA. Lvs. deeply serrate or doubly serrate, broadly elliptic to obovate, 3–6 cm. long.31. *P. triloba*
Calyx-tube tubular, much longer than sepals; lvs. usually elliptic-oblong- 3–7-cm. long, (Sect. 2 CHAMAEAMYGDALUS Focke.)....32. *P. nana*

Subgen. III. CERASUS

Sect. 1. MICROCERASUS

Fls. sessile or nearly so; calyx-tube tubular.
A. Lvs. pubescent, usually on both sides.
B. Fls. white: lvs. broad-elliptic to obovate, green and pubescent beneath.33. *P. tomentosa*
BB. Fls. rose-colored: lvs. elliptic to oblong-lanceolate, white-tomentose beneath.
34. *P. incana*
AA. Lvs. glabrous, elliptic to elliptic-oblong: fls. rose-colored....35. *P. Jacquemontii*
Fls. and fr. distinctly pediceled; calyx-tube cup-shaped; sepals serrulate.
A. Lvs. green beneath, finely serrate or serrulate from near the base; petiole 5–8 mm. long: fr. red.
B. Lvs. ovate, rarely ovate-lanceolate, acuminate, broadest below the middle and rounded or subcordate, sharply doubly serrate....36. *P. japonica*
BB. Lvs. obovate-oblong to lance-oblong, rarely elliptic, acute, finely serrulate or crenulate, broad-cuneate.
C. Lvs. broadest about or below the middle; style glabrous or pilose at base.
37. *P. glandulosa*
CC. Lvs. broadest above the middle: style glabrous....38. *P. humilis*
AA. Lvs. glaucescent beneath, entire toward the base; petiole 8–18 mm. long: fr. purple-black.
B. Lvs. oblanceolate to obovate, ascending: fr. small, adstringent....39. *P. pumila*
BB. Lvs. elliptic to elliptic-lanceolate, spreading: fr. about 1.5 cm. across, sweet.
40. *P. Besseyi*

Sect. 2. PSEUDOCERASUS

Lvs. incisely and doubly serrate or lobulate: Fls. white or pinkish, rather small.
A. Lvs. densely grayish pubescent beneath: fr. red....41. *P. canescens*
AA. Lvs. glabrous or hairy only on veins beneath.
B. Fr. purple-black: style glabrous; sepals entire or irregularly dentate, usually as long as tube.
C. Petioles pubescent: pedicels usually short; fls. about 1 cm. across....42. *P. incisa*
CC. Petioles glabrous: pedicels 1.5–2.5 cm. long: fls. 2–2.5 cm. across....43. *P. nipponica*
BB. Fr. red, about 1 cm. across: style pilose at base; sepals glandular-serrulate, shorter than tube....44. *P. lobulata*
Lvs. simply or only slightly doubly serrate.
A. Fruiting pedicels conspicuously thickened: fls. pink or red.
B. Young shoots glabrous....46. *P. campanulata*
BB. Young shoots rufous-tomentose....47. *P. rufa*
AA. Fruiting pedicels not thickened.
B. Fls. before the lvs. in sessile umbels.
C. Calyx-tube pubescent, narrowed at base: lvs. pubescent beneath at least on midrib, with about 10 pairs of veins or more: involucre small, deciduous....45. *P. subhirtella*
CC. Calyx-tube glabrous: lvs. glabrous beneath at maturity or sometimes pubescent on vigorous shoots: involucre persistent.
D. Lvs. 3–6 cm. broad, with more than 10 pairs of veins: calyx-tube abruptly contracted at base: fr. red....50. *P. Conradinae*
DD. Lvs. 1.5–2.5 cm. broad with 8–10 pairs of veins: calyx-tube narrowed at base: fr. black....49. *P. concinna*
BB. Fls. with the lvs., often racemose.
C. Lvs. closely serrulate, lance-oblong or lanceolate: fls. white, rather small, 1–3 in subsessile umbels: fr. red....48. *P. serrula*
CC. Lvs. rather coarsely serrate or doubly serrate: fls. large, usually in racemes: fr. black or purple-black.
D. Lvs. and brts. glabrous or slightly pubescent.
E. Pedicels, calyx and style glabrous.
F. Lvs. green beneath; teeth long aristate: fls. fragrant....51. *P. Lannesiana*
FF. Lvs. glaucescent beneath; teeth short-aristate: fls. little or not fragrant.
52. *P. serrulata*
EE. Pedicels and usually calyx and style pubescent....53. *P. yedoensis*
DD. Lvs. beneath and brts. pubescent....54. *P. Sieboldii*

Sect. 3. LOBOPETALUM

Sepals shorter than calyx-tube....55. *P. pseudocerasus*
Sepals longer than calyx-tube....56. *P. Dielsiana*

Sect. 4. EUCERASUS

Lvs. obtusely serrate, 4–15 cm. long; petiole 1.5–5 cm. long; sepals about as long as calyx-tube.
A. Lvs. pubescent beneath, at least on veins, to 15 cm. long; inner bud-scales reflexed; infl. without leafy bracts: fr. sweet....57. *P. avium*

AA. Lvs. glabrous, to 7 cm. long; inner bud-scales upright; infl. usually with a few leafy bracts at base: fr. sour.....58. *P. Cerasus*
Lvs. crenate, 2-5 cm. long; petioles 8-15 mm. long; sepals about half as long as calyx-tube.
59. *P. fruticosa*

Sect. 5. MAHALEB

Lvs. suborbicular or broad-ovate: fls. racemose.....60. *P. mahaleb*
Lvs. narrower.
A. Lvs. acute to acuminate, serrulate, rhombic-ovate to ovate-lanceolate, soon glabrous: fls. subumbellate.....61. *P. pennsylvanica*
AA. Lvs. obtuse to acute, usually oblong, indistinctly crenulate.....62. *P. emarginata*

Sect. 6. PHYLLOCERASUS

Fls. few in a small short-stalked umbel.....63. *P. pilosiuscula*

Sect. 7. PHYLLOMAHALEB

Fls. 5–6 in a raceme.....64. *P. Maximowiczii*

Subgen. IV. PADUS

Peduncle leafy.
A. Calyx persistent in fr.
B. Rachis of infl. and brts. glabrous.....65. *P. serotina*
BB. Rachis and young brts. pubescent.....66. *P. alabamensis*
AA. Calyx deciduous in fr.
B. Pedicels thickened in fr. and lenticellate.....67. *P. sericea*
BB. Pedicel not thickened and not lenticellate.
C. Style shorter than stamens.
D. Calyx pubescent inside.
E. Stone sculptured; petals 6–8 mm. long, twice as long as stamens..68. *P. Padus*
EE. Stone smooth; petals 3–5 mm. long, about as long as stamens..69. *P. pubigera*
DD. Calyx glabrous inside; stone smooth or slightly rugose: petals as long or only ⅓ longer than stamens.
E. Lvs. acute or short-acuminate.
F. Lvs. 10–20 cm. long.....70. *P. cornuta*
FF. Lvs. shorter.....71. *P. virginiana*
EE. Lvs. long-acuminate.....72. *P. ssiori*
CC. Style longer than stamens: lvs. long-acuminate.....73. *P. Grayana*

Peduncle naked.
A. Style about as long as stamens: lvs. gland-dotted beneath: calyx deciduous in fr.
74. *P. Maackii*
AA. Style shorter than stamens: lvs. not glandular beneath: calyx persistent in fr.
75. *P. Buergeriana*

Subgen. V. LAUROCERASUS

Lvs. serrate, shorter than racemes.....76. *P. lusitanica*
Lvs. usually entire, longer than racemes.....77. *P. Laurocerasus*

Subgen. I. PRUNOPHORA Focke. Fr. sulcate, glabrous and usually bloomy; stone compressed, usually longer than broad and smooth or nearly so: fls. solitary or in umbel-like cluster, before or rarely with the lvs.: stalk usually remaining with the fr. (except in No. 6). PLUM.

Sect. 1. EUPRUNUS Koehne. Fls. 1–2, rarely to 3, stalked, usually with the lvs.; lvs. convolute in bud.

1. **P. spinōsa** L. BLACKTHORN (Sloe). Much-branched spiny shrub, rarely small tree to 4 m.; young brts. pubescent; buds small, globose-ovoid: lvs. elliptic-ovate to oblong-obovate, 2–4 cm. long, obtuse, finely or crenately serrate, pubescent while young, finally glabrous or sometimes pubescent: fls. before the lvs., usually solitary, 1–1.5 cm. across; pedicels glabrous, rarely pubescent: fr. globose, 1–1.5 cm. across, blue-black, bloomy, of very austere taste; stone turgid. R.I.25:t.80(c). S.E.3:t.408(c). F.D.25:t.2554(c). H.W. 3:89. G.C.III.42:308. Eu., N. Afr., W. Asia.—Var. **plèna** West. With double white fls. Gn.59:76;61:363;88:107(h). G.M.44:165. (Var. *fl. pleno* Kirchn.)—Var. **purpúrea** André. Less spiny: lvs. purplish, larger: fls. pink. Orig. before 1903. ?Hybrid

? *P. s.* × *insititia* = **P. frúticans** Weihe. Usually thornless; lvs. often acutish, 4–5 cm. long: fls. larger: fr. 1.4–1.8 cm. across. R.I.25:t,81(c). Occasionally found wild in Eu.

A closely related species is **P. cúrdica** Fenzl & Fritsch. Lower, more spreading and less spiny: lvs. elliptic, acute, to 9 cm. long, pubescent while young: fls. with the lvs., about 2 cm. across, usually solitary: fr. bluish black; pedicel to 1.4 cm. long, upright. S.H.1:f.346e,347p-q. Armenia. Intr. before 1892.

2. **P. insitítia** L. BULLACE (Damson). Shrub or small tree to 6 m. some-

times slightly spiny: young brts. tomentose: lvs. elliptic to obovate, 4–8 cm. long, coarsely crenate-serrate, pubescent while young, at maturity usually glabrous and dull above; sparingly pubescent beneath, reticulate; petiole 1–2 cm. long: fls. white, 2–2.5 cm. across; pedicels pubescent; sepals glabrous or pubescent: fr. subglobose to ovoid, bluish black; sweet; stone little compressed; flesh clinging. R.I.25:t.82(c). S.E.3:t.409(c). D.F.25:2555(c). Hedrick, Plums N. Y. 34,t.(c). (*P. domestica* var. *i.* Waugh.) W. Asia, Eu. Cult. since prehistoric times.—Var. **subsylvéstris** Boutigny. Spiny; sepals glabrous. The wild form.—Var. **syríaca** Koehne. MIRABELLE. Fr. subglobose, yellow. (*P. s.* Borkh.)—Var. **itálica** Aschers. & Graebn. GREEN-GAGE (Reine Claude). Brts. thinly pubescent: fr. greenish often rather large. (*P. i.* Borkh., *P. Claudiana* Poir., *P. domestica* var. *i.* Schneid.)

P. i. × *spinosa* = *P. fruticans;* see under No. 1.

3. **P. doméstica** L. GARDEN PLUM. Usually small tree to 10 or 12 m.: young brts. glabrous or slightly pubescent when young, becoming glabrous: lvs. elliptic or obovate, 5–10 cm. long, coarsely crenate-serrate, pubescent while young, at maturity glabrous and dull above, pubescent beneath and reticulate; petioles 1.5–2.5 cm. long: fls. greenish white, 1.5–2 cm. across; sepals pubescent inside: fr. usually ovoid to oblong, rarely subglobose, sweet; stone free, nearly smooth. R.I.25:t.83(c). S.E.3:t.410(c). D.F.25:t.2556(c). Hedrick, Plums N. Y. 12,t(c). (*P. communis* Huds., *P. oeconomica* Borkh., *P. damascena* Dierb., *P. pyramidalis* DC.) W. Asia, Eu.—Long cult. in many forms for its fr.

4. **P. cerasífera** Ehrh. CHERRY PLUM. Slender-branched tree to 8 m., sometimes thorny; brts. glabrous: lvs. elliptic or ovate to obovate, 3–6 cm. long, finely obtuse-serrate, acute, broad-cuneate to rounded at base, light green, glabrous, except usually pubescent along the midrib beneath, with usually less than 6 pairs of veins: fls. usually solitary, 2–2.5 cm. across, white; stamens 25–30; pedicels glabrous, 5–15 mm. long: fr. subglobose, red, 2–3 cm. across, slightly bloomy. B.M.5934(c). R.I.25:t.84(c). Gn.33:252;87:109(h). (*P. domestica* var. *myrobalan* L., *P. myrobalana* Loisel.) W. Asia, Caucas. Intr. about or before the 16th cent. Zone V.—Var. **péndula** Bailey. With pendulous brs.—Var. **élegans** Bean. Lvs. narrow, edged with white. R.H. 1899:460. Orig. before 1899.—Var. **Pissártii** Bailey. Lvs. purple, larger: fls. pink; pedicel 1.5–2 cm. long: fr. dark wine-red. R.H.1881:190,t(c);1884:396. G.C.III.1:416;67:194(h). Gn.32:224,t(c);55:315. S.L.313(h). (*P. Pissardii* Carr., *P. c.* var. *atropurpurea* Dipp.) Intr. before 1881.—Var. **Woodii** W. Wood. Lvs. dark purple remaining so all summer. G.W.17:470,t(c). (Var. *Spaethiana* W. Wood.)—Var. **nígra** Bailey. Lvs. very dark purple. —Var. **Purpùsii** Bailey. Lvs. dark red, variegated with yellow and bright rose. —Var. **divaricàta** Bailey. Brs. slenderer: lvs. more often rounded at base: fls. smaller, with the lvs.: fr. yellow, not impressed at base, 1.6–2 cm. across. B.M.6519(c). (*P. d.* Ledeb.) The wild form. Intr. 1820.

P. c. Pissartii × *mume* = **P. blireàna** André. Lvs. purple: differs from *P. c. Pissartii* chiefly in its broader ovate acuminate lvs. rounded at base, semidouble pink fls. on pedicels 1–1.5 cm. long and pubescent ovary. R.H.1905:392,t(c). Gn.78:240;85:109. J.L.40:f.37. M.D.1917:67,f.D. (*P. Pissardii b.* Lemoine, *P. cerasifera* var. *b.* Bean.) Orig. 1895.—Var. **Mòseri** Koehne. Lvs. less purple; petiole and midrib above glabrous (pubescent at first in *P. b.*): fls. slightly smaller and paler. G.C.III.53:190. G.M.55:819. (*P. Pissardii M. fl. pleno* Moser, *P. cerasifera purpurea M.* Spaeth.) Orig. 1894.—Of similar origin is possibly *P. Boehmeri* Koehne. M.D.1917:67,f,C.—*P. c.* × *amygdalo-persica* = **P. gigantèa** Koehne. Lvs. elliptic-oblong to elliptic-lanceolate, 7–12 cm. long; petiole usually with 2 glands: fls. subsessile, sterile; calyx-tube semiglobose; sepals roundish,

slightly villous or subglabrous; petals obovate, very concave, pale pink. R.H. 1908:65. M.D.1917:67,f.B. Cult. 1877.—*P. c.* × *Munsoniana* or *?angustifolia.* "Marianna." Lvs. narrow-elliptic to oblong-obovate, 3.5–7 cm. long, slightly pubescent along the midrib beneath: fr. subglobose or globose-ovoid, 2.5–3 cm. across, red. R.H.1894:278,t(c). A.G.1866:109. Hedrick, Plums N. Y.274,t(c). Orig. about 1880.—*P. c.* × *salicina.* "Motley Plum." With early dark red fr. U.S.Im.193:t.305(h),360(fr). Cult. 1910. Here belongs also "Purple-leaved Kelsey" (*P. c. Pissartii* × *salicina* "Kelsey"). Burbank, Cat.1893:16,f.—*P. c.* × *Armeniaca* = *P. dasycarpa;* see No. 25.—*P. c.* × *triloba* = *P. arnoldiana;* see under No. 31.—*P. c. Pissartii* × *pumila* = *P. cistena;* see under No. 39.

A closely related species is **P. montícola** K. Koch. Shrub to 4 m.: lvs. glabrous, with more than 6 pairs of veins; petioles short: fls. usually 2; stamens 30 or more: fr. red. S.H.1:f.348a-c,349k. Asia Minor. Intr. 1854. Zone V.—Another related species is **P. cocomìlia** Ten. Shrub or small tree with thorny brs.: lvs. elliptic to broad-obovate, 3–5 cm. long, finely serrate: fls. usually 2, about 1 cm. across, white or greenish white; pedicels short, about as long as calyx-tube; sepals erect-spreading: fr. yellow, subglobose or ellipsoid, 3 cm. long. S.H.346m-n,348l-n. Tenore, Fl. Nap.t.144(c). Decaisne, Jard. Fruit.8,t(c). Italy. Intr. 1824. Zone V or VI.

5. **P. salícina** Lindl. Small tree to 10 m.; brts. glabrous, becoming lustrous red-brown: lvs. usually oblong-obovate or elliptic-obovate, 6–10 cm. long, abruptly acuminate, cuneate, doubly obtuse-serrate, bright green and lustrous above, light green and glabrous beneath except the bearded axils; petioles 1–2 cm. long, with several glands: fls. usually 3, white, 1.5–2 cm. across; pedicels 1–1.5 cm. long, glabrous; sepals oblong-ovate, glabrous, slightly toothed: fr. globose-ovoid, with a deep depression at base, 5–7 cm. across, yellow or light red, sometimes green, with deep suture and often pointed at apex. R.H.1895:160,t(c). Gn.78:195. S.H.1:f.346c,347d. (*P. triflora* Roxb., *P. ichangana* Schneid., *P. masu* hort., *P. botan* hort.) China, cult. in Japan. Intr. 1870. Zone V.—Var. **pùbipes** Bailey. Pedicels densely pubescent, rarely glabrescent; calyx pubescent toward base.

P. s. × *Armeniaca.* "Plumcot." Lvs. ovate, acuminate, broad-cuneate or nearly rounded at base. J.L.1906:472,t.130. Orig. before 1906; also cult. in China. —*P. s.* × *Persica.* "Hybrid Plum-Peach." Lvs. oblong, broad-cuneate at base: fls. pink, stalked; style longer than stamens; ovary rudimentary, hairy. G.C.III. 41:256, 257. J.L.1906:t.131. Orig. before 1906.—*P. s.* × *cerasifera;* see under No. 4.—*P. s.* × *Simonii* = *P. sultana;* see under No. 6.—Also *P. s.* × *maritima, P. s.* × *mexicana, P. s.* × *lanata, P. s.* × *americana, P. s.* × *Munsoniana, P. s.* × *hortulana* and *P. s.* × *angustifolia* have been recorded.

A related species is **P. gymnodónta** Koehne. Lvs. 4–7.5 cm. long, with glandless teeth, conduplicate in bud: fls. 1–2, white, 1.5 cm. across; pedicels 1.5–3 mm. long. Manch. Intr. before 1910. Zone V.

6. **P. Simònii** Carr. Apricot Plum. Narrow-pyramidal tree with upright brs.; brts. glabrous: lvs. oblong-lanceolate to oblong-obovate, 7–10 cm. long, acuminate, finely and obtusely serrate, glabrous, dull green above, reticulate beneath; petiole short and stout, with 2–4 large glands: fls. 1–3, short-stalked, 2–2.5 cm. across: fr. much depressed, with a deep suture, 3–5 cm. wide, very short-stalked, maroon-red, with yellow flesh; stone small, suborbicular, rough, clinging. R.H.1872:110,t(c). Gn.70:225. N. China. Intr. 1863. Zone V.—Sometimes cult. for its fr.

P. S. × *salicina* = **P. sultàna** Voss. Here belongs "Wickson." Hedrick, Plums N. Y.376,t(c). M.G.14:544(h).

Sect. 2. Prunocerasus Koehne. Fls. in clusters of 2–5: lvs. usually conduplicate (convolute in Nos. 7, 18 and 19, slightly so in 9 and 17).

7. **P. subcordàta** Benth. Pacific Plum. Shrub or sometimes small tree to 8 m., with almost horizontal brs.; bark grayish brown; young brts. glabrous or pubescent, bright red: lvs. broad-ovate to suborbicular, 3–7 cm. long, obtuse or acutish, usually subcordate at base, sharply and often doubly serrate, pubescent below when young, at maturity glabrous or puberulous;

petiole 1–2 cm. long, glandular: fls. 2–4, white fading to rose, about 1.5 cm. across, on pubescent or glabrous stalks 1 cm. or less long; calyx-lobes oblong, obtuse, pubescent on both sides: fr. red or sometimes yellow, bloomy, ellipsoid, 1.5–3 cm. long. S.S.4:t.154. Ore. to Calif. Intr. about 1850. Zone VI.—Var. **Kellóggii** Lemm. Sisson Plum. Bark ashy gray: lvs. usually not cordate at base, nearly glabrous: fr. large.

8. **P. marítima** Marsh. Beach Plum. Straggling shrub to 2 m., the lower brs. often decumbent; young brts. pubescent: lvs. ovate or elliptic, rarely obovate, 4–6.5 cm. long, acute at ends, sharply serrate, dull green and glabrous above, paler and soft-pubescent beneath; petioles pubescent, rather stout, 4–6 mm. long, often glandular: fls. 2–3, white, 1.2–1.5 cm. across; pedicels 5–7 mm. long, calyx pubescent, lobes obtuse, oblong, entire or dentate at apex, pubescent within; petals oblong-ovate: fr. globose, about 1.5 cm. across, dull purple, bloomy, sometimes crimson; stone ovoid and turgid, truncate at base. B.M.8289(c). Gg.4:287. M.G.19:56(h). S.L.314(h). (*P. sphaerocarpa* Michx., *P. acuminata* Michx., *P. pubescens* Pursh.) Me. to Va., near the coast. Intr. 1818. Zone IV.—Var. **flàva** G. S. Torrey. Fr. yellow. Contrib. Bot. Labor. Univ. Penna. 5:t.66–70,f.4,17,22.—Rarely cult. for its fr.; sometimes for the profuse white fls.

P. m. × *americana* = **P. Dunbàrii** Rehd. Brts. glabrous at maturity: lvs. larger, acuminate, more sharply serrate, less pubescent; pedicels and calyx glabrescent: fr. purple, larger; stone more compressed. Orig. about 1900.

A related species is **P. Gravèsii** Small. Lvs. suborbicular, obtuse or apiculate: stone pointed at base. Conn. Intr. 1902. Zone V.

9. **P. umbellàta** Ell. Small tree to 6 m. with compact head and slender brs.; bark dark brown; brts. glabrous or slightly pubescent at first: lvs. elliptic to lanceolate, 4–7 cm. long, acute, rounded at base or broad-cuneate, finely serrate with acute teeth, glabrous above, usually pubescent beneath along the midrib, rather firm at maturity; petioles 5–7 mm. long, pubescent: fls. 2–4, white, 1–1.8 cm. across; the slender pedicels and calyx glabrous; sepals ovate, obtuse, shorter than tube, slightly hairy without, pubescent within: fr. subglobose, 1–2 cm. across, red, yellow or dark purple, bloomy; stone oval or subglobose, obtuse, smooth or reticulate. S.S.4:155. S. C. to Fla. Intr.? Zone VII?—Var. **injucúnda** Sarg. Lvs. elliptic to elliptic-oblong, acute or acuminate, broad-cuneate, pubescent beneath, slightly so above: stone usually pointed. N. C. and Ga. to Ala. and Miss. (*P. i.* Small.) Intr. 1900. Zone V or VI.—Var. **tarda** W. F. Wight. Bark light reddish brown: lvs. elliptic-oblong or sometimes obovate, acute or short-acuminate, cuneate, finely pubescent or glabrous above, tomentulose beneath; petioles tomentose. Fl.iv; fr.x–xi. S.M.560. Miss., Tex. to S. Ark. Intr. 1903.

10. **P. allegheniënsis** Porter. Alleghany Plum. Straggling shrub or tree to 5 m., often forming thickets; young brts. pubescent or glabrous, soon reddish brown: lvs. narrow-elliptic to oblong-lanceolate, 6–9 cm. long, acuminate, cuneate, sharply and finely serrate, glabrous or sparingly pubescent above, pubescent beneath at least when young; petioles 7–12 mm. long, pubescent, rarely glandular: fls. 2–4, 1–1.2 cm. across; pedicels slender, pubescent or glabrous; calyx-tube pubescent, rarely glabrous; sepals oblong-ovate, sparingly hairy or glabrous within; petals round-obovate, turning pinkish: fr. subglobose, about 1 cm. across, dark purple and bloomy; stone turgid, slightly obovoid and obtusish at apex. S.S.4:t.153. F.G.3:429. B.C.5:2831. M.G.19:54(h). S.L.315(h). Conn. to Pa. Intr. 1889. Zone V.—Var. **Davísii** W. F. Wight. Shrub: lvs. broader, less acuminate, pubescent beneath only at the midrib. Mich. Intr. 1912.

11. **P. mexicàna** S. Wats. Big-tree Plum. Tree to 12 m., not sprouting from the root; brts. pubescent or glabrous: lvs. obovate to oblong-obovate, 6–12 cm. long, abruptly acuminate, usually subcordate, sharply and often doubly serrate, short-pubescent above, at least when young, and rugose, pubescent and somewhat reticulate beneath, thickish at maturity; petioles glandular: fls. 2–4, white, 1.5–2 cm. across, pedicels usually glabrous; calyx-lobes dentate at apex or sometimes entire, slightly glandular, pubescent within: fr. globose, sometimes ellipsoid, 2–3 cm. long, purplish red, bloomy; stone obovoid or subglobose, turgid. S.M.565. S.T.2:t.165. (*P. arkansana* Sarg., *P. australis* Munson.) S. W. Ky. and Tenn. to Okl. and Mex. Zone V. Intr. 1910. Zone V. Used occasionally as stock.

P. m. × *salicina* and *P. m.* × *Reverchonii* have been recorded.

12. **P. lanàta** Mack. & Bush. Small tree sprouting from the root and forming thickets; bark red-brown; brs. spreading, forming a broad round head; brts. glabrous or pubescent: lvs. obovate to oblong-obovate, 6–12 cm. long, acuminate, broad-cuneate, rarely rounded, sharply and often doubly serrate, pubescent beneath; petioles usually glandless: fls. 2–5, white, 2–3 cm. across, pedicels and calyx outside pubescent; lobes acuminate, entire: fr. usually subglobose, 2–3 cm. across, red or yellowish; stone flattened. Hedrick, Plums N. Y. 380,t(c). S.M.563. (*P. americana* var. *mollis* Torr. & Gr., *P. americana* var. *l.* Sudw., *P. Palmeri* Sarg.) Ill., Iowa and Mo. to Tex. Intr. 1903. Zone V.—Cult. occasionally for its fr.

13. **P. americàna** Marsh. Tree, much like the preceding; young brts. glabrous: lvs. obovate to oblong-obovate, 6–10 cm. long, acuminate, broad-cuneate, sharply and often doubly serrate, glabrous or slightly pubescent along the midrib beneath; petioles glandless: fls. 2–5, white, 2–3 cm. across; calyx outside and pedicels glabrous, lobes acuminate, entire: fr. usually subglobose, 2–3 cm. across, red, rarely yellowish; stone compressed. S.S.4: t.150. B.C.5:2827,2828. M.G.19:52,53(h). Hedrick, Plums N. Y. 56,t(c), 382,t(c). Mass. to Man., s. to Ga., N. Mex. and Utah. Cult. 1768. Zone IV.—Many pomological varieties are grown; sometimes planted for its fls.

P. a. × *maritima* = *P. Dunbarii;* see under No. 8.—*P. a.* × *angustifolia* = *P. orthosepala;* see under No. 18.—*P. a.* × *salicina, P. a.* × *hortulana, P. a.* × *Munsoniana, P. a.* × *utahensis* and *P. a.* × *pumila* have been recorded.

14. **P. nígra** Ait. Canada Plum. Small tree to 6 m.; rarely 10 m. tall, with upright brs. forming a narrow head; bark red brown to gray brown; young brts. glabrous or pubescent: lvs. elliptic to obovate, 6–10 cm. long, acuminate, broad-cuneate to subcordate, coarsely and doubly obtuse-serrate, glabrous above, pubescent or nearly glabrous beneath; petioles 1.5–2.5 cm. long, biglandular: fls. 3–4, white fading to pink, 2–3 cm. across; calyx like the slender stalks reddish and glabrous, lobes acute, glandular-serrate, becoming reflexed; petals broad-ovate: fr. ellipsoid, 2–3 cm. long, red or yellowish red; stone compressed. S.S.4:t.149. B.M.1117(c). Em.2:511,t(c). S.L.314(h). M.G.19:54(h). (*P. americana* var. *n.* Waugh, *P. borealis* Poir.) N. B. to Assin., s. to N. Y., Ohio and Wisc. Intr. 1773. Zone II.

15. **P. hortulàna** Bailey. Tree to 10 m., not sprouting from the root; bark brown, thin scaly; young brts. glabrous becoming dark red-brown: lvs. oblong-ovate to oblong-obovate, rarely oblong-lanceolate, 7–11 cm. long, glabrous and lustrous above, slightly pubescent beneath at least along the midrib and veins, rather thick at maturity; petioles slender, 1.5–2.5 cm. long, usually with 1 or more glands, pubescent above: fls. 2–4, white, 1.2–1.5 cm. across; pedicels slender, like the calyx glabrous, lobes oblong-ovate, glandular-

ciliate, as long or nearly as long as tube, acute or obtuse, sometimes slightly pubescent outside, pubescent inside, usually finally reflexed: fr. globose or short-ellipsoid, 1.8–3 cm. long, red or yellow, slightly or not bloomy; stone subglobose to ellipsoid, reticulate. S.M.568. B.C.5:2828. Hedrick, Plums N. Y. 384,t(c). (*P. hortulana* var. *Waylandii* Bailey.) Ky. and Tenn. to Iowa and Okl. Cult. 1890. Zone V.—Var. **Mîneri** Bailey. Lvs. thicker and duller, more veiny beneath. Hedrick, Plums N. Y. 209,t(c),272,t(c).—Var. **pubéscens** Sarg. Young brts. and lvs. beneath pubescent.—Often cult. for its fr.

P. h. × *salicina*, *P. h.* × *americana* and *P. h.* × *Munsoniana* have been recorded.

16. **P. Munsoniàna** Wight & Hedr. Wild Goose Plum. Tree to 8 m.; brts. glabrous, soon chestnut-brown: lvs. oblong-lanceolate to lanceolate, rarely obovate-oblong, 6–10 cm. long, acute or acuminate, rounded at base, finely glandular-serrate, bright green and lustrous above, paler beneath and rather sparingly pubescent along the midrib and veins, sometimes pubescent all over when young, rarely quite glabrous, rather thin at maturity; petioles 1.5–2 cm. long, usually biglandular, pubescent above: fls. 2–4, 1.2–1.5 cm. across; pedicels slender, glabrous; calyx-lobes ovate-oblong, as long as the glabrous tube, glandular-ciliate, glabrous or slightly pubescent outside, pubescent inside near base; petals obovate to oblong-obovate: fr. globose to short-ellipsoid, 1.5–2.5 cm. long, red, rarely yellow, slightly bloomy; stone oval, usually truncate at base. Fl.iv–v; fr.vii–viii. S.M.569. B.C.5:2830. Hedrick, Plums N. Y. 378,t(c). Ky. and Tenn. to Kans. and n. Tex.—Cult. occasionally for its fr. in many pomological vars. Zone V.

P. M. × *cerasifera;* see under No. 4.—*P. M.* × *salicina*, *P. M.* × *sultana*, *P. M.* × *americana*, *P. M.* × *hortulana*, *P. M.* × *angustifolia* and *P. M.* × *Persica* have been recorded.

17. **P. Reverchònii** Sarg. Hog Plum. Shrub to 2 m., forming dense thickets; bark gray; young brts. glabrous, chestnut-brown: lvs. lanceolate or lance-ovate, 5–7 cm. long, acuminate, cuneate or rounded at base, crenately glandular-serrate, strongly trough-shaped, green and glabrous above, paler beneath and slightly pubescent, rarely densely so while young; petioles 7–12 mm. long, with 2–4 glands at apex, pubescent above: fls. 2–4, about 1 cm. broad; pedicels glabrous, 6–10 mm. long; calyx sparingly hairy outside, lobes oblong or oblong-ovate, glandular-ciliate, shorter than tube, pubescent within; erect or spreading; petals obovate or oblong-obovate: fr. globose or subglobose, 1.5–2 cm. across, usually yellow with crimson cheek, rarely red; stone oblong, pointed at ends, smooth or slightly reticulate. Fl.iii–iv; fr. vii–viii. U. S. Dept. Agr. Bull. 179:t.3,f.2,t.10,f.13–22. (*P. pygma* Munson, not *P. pygmaea* Willd.) Okl., Tex. Intr. 1916. Zone V.—Of no importance.

P. R. × *mexicana* has been recorded.

A closely related species is **P. rivulàris** Scheele. Creek Plum. Lvs. ovate to oblong-ovate, or slightly obovate, not strongly trough-shaped, petioles glandless or with 1 or 2 glands; sepals finally reflexed: fr. subglobose, 1.5 cm. diam., red, slightly bloomy; stone subglobose or oval. U. S. Dept. Agr. Bull.179:t.3,f.3;t.10,f. 23, 24. (*P. texana* Scheele, not Dietr.) Tex. Intr. 1917. Zone V.

18. **P. angustifòlia** Marsh. Chickasaw Plum. Twiggy shrub forming thickets, or small tree to 4 m.; brts. slender, zigzag, glabrous, reddish: lvs. lanceolate to oblong-lanceolate, strongly trough-shaped, 2–5 cm. long, acute or short-acuminate, broadly cuneate or rounded at base, finely glandular serrate, glabrous and lustrous above, paler beneath and glabrous or pubescent along the midrib toward the base; petioles glandular or glandless: fls. 2–4, 8–9 mm. across; pedicels 3–6 mm. long, glabrous; calyx glabrous, the lobes

ovate, shorter than tube, glandless, glabrous inside except near base: fr. subglobose, 1–1.5 cm. across, red or yellow, with thin skin; stone oval, obtuse at ends or acute at apex. Fls.III–IV; fr.VII–VIII. S.S.4:152. (*P. chicasa* Michx.) Md. and s. Delaw. to Fla., w. to Ark. and Tex. Intr. 1874? Zone V.—Var. **Watsònii** Waugh. Sand Plum. Lvs. smaller, elliptic to elliptic-oblong, acute, less conspicuously serrulate: fls. smaller; fr. with thicker skin. G.F.7:135. B.C.5:2829. M.G.19:55(h). (*P. W.* Sarg.) Kans. to Tex. and N. Mex. Cult. 1879.—Var. **vàrians** Wight & Hedr. Rather larger and more robust: lvs. larger; pedicels longer: stone usually more pointed at apex. Okl., Tex. Cult. for its fr.

P. a. Watsonii × *americana* = **P. orthosépala** Koehne. Spreading shrub to 2 m.; it differs from *P. angustifolia* chiefly in its oblong-lanceolate to obovate-lanceolate, slightly larger and broader and more sharply serrate lvs., the larger fls. and larger frs. about 2.5 cm. across. G.F.7:187. B.C.5:2830. Orig. in Kans. Intr. 1880. Zone V.—*P. a. Watsonii* × *Besseyi* = *P. utahensis;* see under No. 40.—Also *P. a.* × *salicina* and *P. a. varians* × *Munsoniana* have been recorded.

19. **P. grácilis** Engelm. & Gr. Oklahoma Plum. Straggling shrub to 1.5 m., forming thickets; young brts. pubescent, later reddish brown: lvs. elliptic to ovate, 2.5–5 cm. long, acute at ends, rarely obtuse, finely serrate with acute or obtuse teeth, finely and slightly pubescent above, reticulate and densely pubescent below; petioles pubescent, glandless: fls. 2–4, about 1 cm. broad; pedicels and calyx finely pubescent; calyx-lobes ovate, acute, entire or denticulate, pubescent on both sides: fr. subglobose, about 1.5 cm. thick, usually red, slightly bloomy; stone oval, obtusish at ends. S.H.1:f. 345i(l). (*P. normalis* Small.) W. Ark., Okl. and N. Tex. Intr. 1916. Zone V.

A closely related species is **P. venulòsa** Sarg. Larger shrub: lvs. larger, ovate to oblong-ovate, often short-acuminate and rounded at base, strongly reticulate beneath: fls. smaller; pedicels glabrous or nearly so: fr. somewhat larger, dark red. U. S. Dept. Agr. Bull.179:t.7,f.2;t.12,f.22–24. Tex. Intr. 1916.

Sect. 3. Armeniaca K. Koch. Fls. usually sessile or short-stalked (long-stalked in No. 25), ovary and fr. pubescent (glabrous in No. 20): lvs. convolute, round-ovate to ovate, simply or doubly serrate: stone smooth or pitted; thornless shrubs or trees, the fls. before the lvs., except in No. 20).

20. **P. brigantíaca** Vill. Briançon Apricot. Shrub or small tree; young brts. glabrous: lvs. ovate, 4–7.5 cm. long, short-acuminate, often subcordate, sharply and doubly serrate, pubescent beneath, chiefly on the veins: fls. 2–5, with the lvs., white or pinkish, 1.5–2 cm. across, short-stalked: fr. yellow, smooth, round. N.D.5:t.59(c). L.A.2:684. (*Armeniaca b.* Pers.) S. E. France. Long cult. The seeds yield a perfumed oil "l'huile de marmotte."

21. **P. mandshùrica** Koehne. Manchurian Apricot. Small tree to 5 m., with spreading and slightly pendulous brs.: lvs. broad-elliptic to ovate, 5–12 cm. long, acuminate, rounded or broad-cuneate at base, sharply and doubly serrate, with narrow elongated teeth, green beneath and glabrous except axillary tufts of hairs; petioles 2–3 cm. long: fls. solitary, pinkish, about 3 cm. across; pedicels 2–5 mm. long: fr. yellow, subglobose, 2.5 cm. across; stone small, with obtuse edges. N.K.5:t.25. S.H.:f.349e,350f. (*P. Armeniaca* var. *m.* Maxim.) Manch. Cult. 1900. Zone V.

22. **P. sibírica** L. Siberian Apricot. Upright tree or shrub to 5 m., lvs. ovate, 5–8 cm. long, long-acuminate, finely serrate, reddish when young: then bright green, glabrous except axillary tufts of hairs beneath; petioles 1–3 cm. long, reddish: fls. solitary, white or pink, 3 cm. across; pedicels and calyx nearly glabrous: fr. subsessile, yellow with reddish cheek, little fleshy and scarcely edible; stone smooth with sharp nearly winged edge. L.B.1627(c). Gs.3:74. S.H.1:f.349c,350g-h[1]. (*P. Armeniaca* var. *s.* K. Koch, *Armeniaca s.* Pers.) E. Siber., Manch., N. China. Intr. about 1800. Zone V or IV.

23. **P. Armeníaca** L. Apricot. Round-headed tree to 10 m.; bark reddish; brts. brownish: lvs. broad-ovate or orbicular-ovate, 5–10 cm. long, abruptly acuminate, subcordate or rounded, closely and obtusely serrate, glabrous or with axillary tufts of hairs beneath; petioles 2–3 cm. long; fls. solitary, white or pinkish, about 2.5 cm. across; fr. round, 3 cm. across or more, yellowish with red cheek, nearly glabrous; stone smooth with a thickened furrowed edge. N.D.5:t.49(c). R.I.25:t.85(c). D.F.25:t.2553(c). M.A. t.23(h). Gn.M.31:259(h). (*Armeniaca vulgaris* Lam.) W. Asia. Long cult. Zone V or VI.—Var. **variegàta** Schneid. With variegated lvs. Orig. before 1770.—Var. **péndula** Jaeg. Brs. pendulous. Orig. before 1889.—Var. **ansu** Maxim. Lvs. broad-elliptic to broad-ovate, usually broad-cuneate or truncate at base: fls. usually 2, pink: fr. subglobose, red, tomentose; stone free, minutely reticulate and with a very sharp edge. (*P. a.* Komar.) Cult. in Japan and Korea. Cult. 1880.—Cult. for its fr. in many pomological varieties.

P. A. × *salicina;* see under No. 5.—*P. A.* × *cerasifera* = *P. dasycarpa;* see No. 25.

24. **P. mume** Sieb. & Zucc. Japanese Apricot. Round-headed tree to 10 m. or shrub; bark gray or greenish; brts. slender, green: lvs. broad-ovate to ovate, 4–10 cm. long, long-acuminate, usually broad-cuneate, finely and sharply serrate, pubescent on both sides or only on the veins beneath; petioles glandular: fls. 1–2, very short-stalked, light pink, fragrant; petals obovate: fr. globose, 2–3 cm. across, yellow or greenish, scarcely edible; stone pitted, the flesh adhering. R.H.1885:564,t(c). Gn.50:164,t(c). N.K.5:t.24. G.C.III.29:183. Miyoshi, Atl. Jap. Veg. 1:t.1(h). (*Armeniaca m.* Sieb.) Japan, China. Intr. 1844. Zone VI.—Var. **alba** Rehd. Fls. white. R.H. 1885:564.—Var. **Alphândii** Rehd. Fls. pink, double. (Var. *fl. pleno* Bean.) R.H.1885:564,t(c).—Var. **albo-plèna** Bailey. Fls. white, double. (Var. *alba plena* Bean.)—Var. **péndula** Nichols. With pendulous brs. U. S. Im. 23:t.325, 326(h).—Var. **tónsa** Rehd. Lvs. nearly glabrous, often broad-cuneate at base: fls. white. China.

P. m. × *cerasifera* = *P. blireana;* see under No. 4.

25. **P. dasycârpa** Ehrh. Purple Apricot. Small tree to 6 m.; young brts. glabrous, purplish: lvs. elliptic-ovate to ovate, 3–6 cm. long, acuminate, finely and closely serrate, dull green above, pubescent beneath on the veins; petioles 1.5–2.5 cm. long, glandular or glandless: fls. white, 2 cm. across; pedicels slender, pubescent: fr. globose, 3 cm. across, dark purple, bloomy, minutely pubescent. B.R.1243(c). N.D.5:t.51,f.1(c). L.B.1250(c). (Black Apricot.) Probably *P. Armeniaca* × *cerasifera*. Orig. before 1780. Zone V. —Fls. early and showy, before the lvs.; fr. rarely produced.

Subgen. II. AMYGDALUS Focke. Fls. sessile or short-stalked, before the lvs.: fr. tomentose (glabrous in a var. of *P. persica*), usually dehiscent; stone pitted or smooth: lvs. conduplicate in bud:—buds 3 in each axil, the latheral ones fl.-buds; terminal bud present.

26. **P. commûnis** Arcang., not Huds. Almond. Tree to 8 m., with gray bark; brts. glabrous: lvs. ovate-lanceolate to narrow-lanceolate, broadest usually slightly below the middle, 7–12 cm. long, long-acuminate, broad-cuneate or nearly rounded at base, finely serrulate, glabrous; petioles to 2.5 cm. long, glandular: fls. 1–2 pink or nearly white, 3–5 cm. across, nearly sessile; calyx-lobes oblong, villous at the margin: fr. ellipsoidal, compressed, 3–6 cm. long, velvety, dry, splitting; stone smooth, pitted. N.D.4:t.29(c). D.F.25:t.2550(c). G.O.t.141(c). R.I.25:t.87(c). Gn.50:312,t(c);54:122,t(c). (*Amygdalus communis* L., *P. Amygdalus* Batsch.) W. Asia, ?N. Afr. Cult. since ancient times. Zone VI or VII.—Var. **variegàta** Schneid. Lvs. variegated.—Var. **albo-plèna** Schneid. Fls. double, white.—Var. **roseo-plèna**

Schneid. Fls. pink, double.—Var. **purpúrea** Schneid. Fls. rose-purple.—Var. **péndula** Schneid. Brs. pendulous.—Var. **amàra** Schneid. Fls. large, darker in centre: lvs. broadest about the middle: kernel bitter. (*P. A.* var. *a.* DC.) —Var. **dúlcis** Schneid. Lvs. somewhat glaucous, broadest toward the base: style exceeding the stamens: kernel sweet. (*P. A.* var. *d.* DC.)—Var. **frágilis** Schneid. Stone with thin fragile shell; kernel sweet. (*P. A.* var. *f.* Ser.)

P. c. × *Persica* = **P. amýgdalo-pérsica** Rehd. Lvs. similar to *P. communis*, but more sharply serrate: fls. large, pink: fr. more peach-like, but with rather dry flesh and finally dehiscent; stone with hard shell, pitted and furrowed. Jaume St. Hilaire, Fl. & Pom.t.368(c). R.H.1908:64(fr). Jour. Hered.12:328(h),329. Gt.74:477. M.A.t.20(h). (*P. persico-amygdala* Schneid., *P. persicoides* Aschers. & Graebn., *Amygdalus communis* var. *persicoides* Ser.) Orig. before the 16th cent. Zone V.—*P. a.* × *cerasifera* = *P. gigantea;* see under no. 4.

A closely related species is **P. Fenzliàna** Fritsch. Lower, sometimes spinescent: lvs. narrowly oblong-ovate, broadest near base, 6–8 cm. long, grayish or bluish green: fls. whitish: fr. scarcely fleshy; stone shorter. S.H.1:f.333a,334d-f. (*Amygdalus divaricata* Hort. Petrop.) Cauc. Intr. before 1890. Zone VI.

27. **P. Pérsica** Batsch. Peach. Tree to 8 m.; brts. glabrous; buds pubescent: lvs. elliptic-lanceolate or oblong-lanceolate; broadest about or slightly above the middle, 8–15 cm. long, long-acuminate, broad-cuneate at base, serrate or serrulate, glabrous; petioles glandular, 1–1.5 cm. long: fls. usually solitary, pink, 2.5–3.5 cm. across, very short-stalked; sepals pubescent outside: fr. subglobose, 5–7 cm. across, tomentose, fleshy; stone deeply pitted and furrowed, very hard. N.D.6:t.2,3(c). R.I.25:t.86(c). G.O.t.140(c). D.F.25:t. 2552(c). (*Amygdalus P.*L., *Persica vulgaris* Mill.) China. Cult. since ancient times. Zone V.—Var. **atropurpúrea** Schneid. Lvs. purple. F.S.19:t. 1986(c).—Var. **alba** Schneid. Fls. white. B.R.1586(c).—Var. **duplex** Rehd. Fls. double, pink. R.H.1852:221,t(c). (Var. *fl. pleno* and *fl. roseo-pleno* Hort.) Orig. before 1636.—Var. **camelliaeflòra** Dipp. Fls. semidouble, deep red. F.S.13:t.1299(c). I.H.5:t.165(c). B.H.8:164,t(c).—Var. **dianthiflòra** Dipp. Fls. semidouble, pink. F.S.13:t.1300(c).—Var. **albo-plèna** Schneid. Fls. semidouble, white. F.S.10,t.969(c).—Var. **rubro-plèna** Schneid. Fls. semidouble, red. F.S.10:t.969(c).—Var. **magnífica** Schneid. Fls. double, bright red. Gn. 56:516,t(c).—Var. **versícolor** Voss. Fls. semidouble, white, red and striped on same plant. F.S.13:t.1319(c).—Var. **pyramidàlis** Dippel. Of narrow pyramidal habit.—Var. **péndula** Dipp. Brs. pendulous.

A large number of forms are cult. for their fr. and these may be classed under the following varieties: Var. **scleropérsica** Voss. Clingstone P. The flesh adhering to the stone (*Persica vulgaris* var. *s.* Koch).—Var. **aganopérsica** Voss. Freestone P. Stone separating from the flesh. (*Persica vulg.* var. *a.* Koch.)—Var. **nucipérsica** Schneid. Nectarine. Lvs. usually more strongly serrate: fr. glabrous, smaller. (*Amygdalus Persica* var. *n.* L., *A. P.* var. *nectarina* Ait., *P. Persica* var. *nect.* Maxim., *P. persica* var. *laevis* Gray.) Of this var. there are two forms: Var. **scleronucipérsica** Rehd., stone adhering to the flesh and var. **aganonucipérsica** Rehd., stone separating from the flesh. —Var. **compréssa** Bean. Flat P. Fr. much flattened from above, not much thicker than the length of the small, irregular rough stone. R.H.1870:111,t(c). J.1:154. L.A.2:680. B.C.5:2493. (*Persica platycarpa* Decne., *Persica vulg.* var. *compressa* Loud., *P. P.* var. *platycarpa* Bailey.) China. Cult. 1822.

P. P. × *salicina;* see under No. 5.—*P. P.* × *Munsoniana* has been recorded.

A closely related species is **P. kansuénsis** Rehd. Winter-buds glabrous: lvs. broadest below the middle, less closely serrate, villous along the midrib near base; style longer than stamens, about as long as petals; stone furrowed, but not pitted. (*Amygdalus k.* Skeels.) N. W. China. Intr. 1914.

28. **P. Davidiàna** Franch. Tree to 10 m., with upright slender brs.;

young brts. glabrous: lvs. narrowly ovate-lanceolate, 6–12 cm. long, broadest near base, gradually long-acuminate, broad-cuneate, finely and sharply serrate, light green, glabrous; petioles glandular: fls. solitary, light pink, about 2.5 cm. across on very short stalks; calyx-lobes oval, glabrous: fr. globose, 3 cm. across, yellowish; stone small, pitted, free. Fl.III–IV. R.H.1872:75. Gt.44:t.1412(c). G.F.10:503. G.C.III.11:529. (*Persica D.* Carr.) China. Intr. 1865. Zone V.—Var. **alba** Bean. Fls. white. Gt.44:t.1412(c). Gn.50: 165. (Var. *albiflora* Schneid.)—Var. **rubra** Bean. Fls. bright rosy red.—Ornamental tree, flowering very early.—Var. **Potanínii** Rehd. Lvs. ovate-lanceolate, rounded at base, acute or acuminate, crenate, lustrous above, firm, 6–7.5 cm. long: fr. ellipsoid. U. S. Im. 106:858,t. (*P. Persica* var. *P.* Batal.) N. W. China. Intr. 1914. Zone V.

29. **P. mìra** Koehne. Tree to 10 m., with slender brs.; brts. glabrous, green: lvs. lanceolate, 5–10 cm. long, gradually long-acuminate, rounded at base, remotely crenate-serrulate, entire near apex, villous along the midrib beneath; petioles 8–15 mm. long, with 2–4 glands: fls. solitary or 2, white, 2–2.5 cm. across, very short-stalked; sepals oval, slightly villous on margin; petals roundish-obovate: fr. subglobose, about 3 cm. across, fleshy, densely tomentose; stone ovate, compressed, smooth. W. China. Intr. 1910 or before 1880. (?*Amygdalus lancifolia* Carr.) Zone VI.—Very distinct from all other species of this group by the smooth stone.

30. **P. dehíscens** Koehne. Dense shrub to 4 m., with spreading spiny brs.; brts. glabrous, brown: lvs. usually fascicled, oblanceolate or oblong, 1–3 cm. long, acute or obtuse, mucronulate, cuneate, crenulate, dark green above, pale green beneath with 5–8 pairs of veins: fls. sessile, solitary, 2.5 cm. across; sepals oval, glabrous, obscurely denticulate, about as long as tube; petals obovate; stamens about 30 in 2 series: fr. subsessile, about 2 cm. across, densely tomentose, with thin flesh, dehiscent; stone roundish, keeled on both sides, rugose. G.C.III.77:200. W. China. Intr. 1910. Zone VI.

A closely related species is **P. mongòlica** Maxim. Lvs. broad-elliptic, about 1 cm. long, with usually 4 pairs of veins: fr. smaller, slightly tomentulose; stone adhering to the flesh. Mongol. Intr. 1866.

To this group also belong: **P. argéntea** Rehd. Unarmed shrub to 3 m.; brts. whitish tomentose: lvs. elliptic or ovate, 2–3.5 cm. long, white-tomentose, obscurely serrulate, short-stalked: fls. rose, 2–2.5 cm. across: fr. ovoid, 1.5 cm. long, whitish-tomentose. L.B.1137(c). (*Amygdalus orientalis* Mill., *A. argentea* Lam., *P. orientalis* Koehne, not Walp.) W. Asia. Intr. 1756. Zone VII?—**P. fasciculàta** Gray. Shrub to 1 m., with spreading spinescent brs.: brts. puberulous: lvs. fascicled, linear-spatulate, 1–2 cm. long, entire, finely pubescent: fls. 2–5, small, greenish white: fr. globose-ovoid, about 1.5 cm. long, villous. S.H.1:f.335f-h. Torrey, Pl. Frémont.t.5. (*Emplectocladus f.* Torr., *Amygdalus f.* Gray.) Calif. to Ariz. Intr. before 1881. Zone VI or VII.—**P. pedunculàta** Maxim. Shrub to 2 m.; brts. tomentulose, dark brown: lvs. elliptic to oblong, irregularly dentate, 2.5–4 cm. long, pubescent at least beneath, when young: fls. solitary, pinkish; pedicels as long or twice as long as calyx-tube: fr. ovoid, little over 1 cm. long, pubescent; stone smooth. S.H.1:f.335a-c. R.H.1864:370. Nov. Act. Petrop.7:t.8,9. (*Amygdalus p.* Pall.) Siberia. Intr. before 1860. Zone V.—*Amygdalus Boissieri* Carr. referred here by Schneider, probably does not belong to this species. R.H.1875:352; 1879:299.

31. **P. tríloba** Lindl. Flowering Plum. (Flowering Almond.) Shrub or small tree to 5 m.; young brts. glabrous or slightly pubescent: lvs. broad-elliptic to obovate, 3–6 cm. long, broad-cuneate at base, acuminate or sometimes 3-lobed at apex, coarsely and doubly serrate; slightly pubescent beneath; petiole about 5 mm. long: fls. 1–2, pinkish, 2–2.5 cm. broad; calyx-tube broad-campanulate, shorter than pedicel; sepals ovate, serrulate, glabrous or pilose outside; stamens about 30; ovary pubescent: fr. red, subglobose, 1–1.5 cm.

across, hairy; stone with thick bony shell. (*Amygdalopsis Lindleyi* Carr., *Prunopsis L.* André.) China.—Var. **plena** Dipp. Fls. double, pink; sepals usually 10. F.S.15:t.1532(c). R.H.1862:91,t(c);1870:388(fr);1883:367(fr). I.H.8:t.308. B.S.2:256,t(h). Intr. 1855. Zone V. This is the type of the species.—Var. **normàlis** Rehd. Fls. single. B.M.8061(c). Intr. 1884. Zone V.—The double-flowered form is a favorite ornamental shrub.—Var. **Petzóldii** Bailey. Brts. glabrous: lvs. elliptic or ovate, broadest at the middle or below, never 3-lobed, glabrous beneath at maturity; pedicels as long as calyx-tube; sepals and petals about 10; calyx-tube glabrous inside; petals rose. (*P. P.* K. Koch, *P. virgata* Hort.) Cult. in China. Cult. 1869. Zone V.

P. t. × *cerasifera* = **P. arnoldiàna** Rehd. Differs chiefly in the white flowers appearing with the lvs., the longer pedicels, reflexed calyx-lobes pubescent inside, in the generally elliptic less coarsely serrate lvs. and larger more succulent and less hairy fr. Orig. 1902.

A closely related species is **P. baldschuànica** Reg. Spreading shrub: brts. glabrous: lvs. obovate to oblong-obovate, acuminate, teeth larger and more acuminate; calyx-tube campanulate, as long as broad; sepals entire; stamens 20. Gs.5:68,t(c). S.H.1:f.334n-o(as *P. Petzoldii*). Turkest. Cult. 1890. Zone V.

32. **P. nàna** Stokes. Dwarf Russian Almond. Low shrub to 1.5 m.; brts. glabrous: lvs. lanceolate or oblanceolate to oblong-obovate, 3–7 cm. long, acute or acutish, cuneate, sharply serrate, glabrous, light green and prominently veined beneath, thickish; petioles 2–6 mm. long: fls. 1–3, rosy-red, 1–2 cm. across, sessile; sepals serrate; petals oblong-obovate: fr. ovoid, about 2 cm. long, pubescent; stone broadly ovoid, rugose. R.I.25:t.88(c). B.M.161(c). L.B.1114(c). (*Amygdalus n.* L.) S. E. Eu., W. Asia to E. Siber. Intr. 1683. Zone V.—Var. **geórgica** DC. Typical form with narrower, lustrous, deeply serrate lvs. A white-flowered form is var. **alba** Nichols.—Var. **Gessleriàna** Schneid. Lower: fls. bright pink, 2–2.5 cm. across.—Var. **campéstris** Beck. Lvs. elliptic to obovate-oblong: fr. subglobose. R.I.25:t.88,f.6–9(c). A white-fld. form is var. **albiflòra** Schneid.

A closely related species is **P. Sweginzòwii** Koehne. Lvs. sharply doubly serrate; stipules leaf-like, large: fls. rose; calyx-tube about 1 cm. long; sepals glandular-serrate. M.D.1910:98. S.H.2:f.596g-i. Turkest. Intr. before 1910.—Another related species is **P. Petunnikówi** Rehd. Lvs. narrow-lanceolate or narrow-oblanceolate, 1–3 cm. long, acute, gradually narrowed at base, sharply serrate with glandular-mucronate teeth: fr. oblong-ellipsoid, about 2 cm. long, subsessile, compressed, oblique at base; stone slightly rugulose, apiculate-rostrate at base. (*Amygdalus P.* Litvin.) Turkest. Cult. 1912. Zone V.

Subgen. III. CERASUS Pers. Lvs. conduplicate in vernation: fls. white or rose-colored, usually stalked, solitary or fascicled or racemose; calyx-tube cup-shaped, or tubular and fls. sessile; style furrowed; stigma emarginate; ovary usually glabrous; stone smooth or furrowed and pitted.

Sect. 1. Microcerasus Webb. Shrubs; buds on flowering brts. 3, the 2 lateral ones fl.-buds; fls. sessile or stalked; calyx-tube tubular or cup-shaped.

33. **P. tomentòsa** Thunb. Spreading shrub to 3 m. or rarely small tree; young brts. tomentose: lvs. crowded, obovate to elliptic, 5–7 cm. long, abruptly acuminate, unequally serrate, rugose, dull green and pubescent above, densely villous beneath; petioles 2–4 mm. long; fls. before or with the lvs., 1–2, white, slightly pinkish, 1.5–2 cm. across; calyx-tube pubescent outside; sepals serrate: fr. subglobose, scarlet, about 1 cm. across, glabrous or slightly hairy, edible. Fl.III–IV; fr.VI–VII. B.M.8196(c). G.F.5:581. A.G.12:77. Hedrick, Cherr. N. Y. 34,t(c). Jour. Hered. 15:169–75. (*Cerasus t.* Wall.; *P. trichocarpa* Bge.) N. and W. China. Japan, Himal. Cult. 1870. Zone IV.—Var. **endótricha** Koehne. Lvs. elliptic to oblong, 2.5–5 cm. long: fls. white, very abundant. C. and W. China. Intr. 1908.—Handsome free-flowering shrub, also ornamental in fr.

P. t. × *Besseyi*, *P. t.* × *pumila*, *P. t.* × *?domestica* have been recorded.

A closely related species is **P. cinerascens** Franch. It differs chiefly in the longer pedicels and in the ovary being glabrous except at apex. W. China. Intr. ?

34. **P. incàna** Stev. Shrub to 2 m., of loose habit; brts. minutely pubescent: lvs. oblong-ovate to lanceolate, 3–6 cm. long, acute or obtusish, finely and sharply serrate, dark green and smooth above, grayish or white-tomentose beneath; petioles about 2 mm. long: fls. with the lvs., 1–2, rose-colored, about 1 cm. across; sepals short, obtuse, entire, pubescent outside: fr. red, 6–8 mm. across. B.R.25:58(c). R.H.1853:281,t(c). Gt.44:243. (*Cerasus i.* Spach, *Amygdalus i.* Pall.) S. E. Eu., W. Asia. Intr. 1815. Zone V.

P. i. × *pumila* = **P. Maùreri** Zab. Differs in its broader less pubescent lvs., longer stamens; from *P. pumila* in its pubescent lvs. and tubular calyx-tube. S.H.1:f.338n(1). Orig. before 1888.

Related species are: **P. prostràta** Labill. Low wide-spreading shrub, to 1 m.; lvs. broad-ovate, 2–3.5 cm. long, sharply serrate, pubescent beneath: fls. 1.5 cm. across, rose-colored. R.I.25:t.89(c). N.D.5:t.53,f.2(c). Medit. Reg., W. Asia. Intr. 1802. Zone V or VI. (*Cerasus p.* Lois.)—**P. microcàrpa** C. A. Mey. Shrub to 1.5 m. with short stiff brs.; brts. pubescent: lvs. ovate to elliptic, acute, 1–2.5 cm. long, serrate, glabrous or slightly hairy beneath: fls. 2–3, rosy-pink; calyx smooth; pedicels pubescent, 6–8 mm. long; fr. ovoid, 1 cm. long. B.M.8360(c). (*Cerasus m.* Boiss.) Asia Minor. Intr. 1890. Zone VI?—Var. **tortuòsa** Schneid. Brts. tortuose: lvs. pubescent. (*Cerasus t.* Boiss. & Hausskn.) S.H.1:f.337w-x[1],338 g-h. Intr. ?

35. **P. Jacquemóntii** Hook f. Shrub to 4 m. with slender brs.: lvs. elliptic to obovate-oblong, 3–6 cm. long, acute at ends, sharply serrate, glabrous; petioles 6 mm. long: fls. usually 2, rose-colored, 1 cm. across; calyx-tube glabrous; sepals ovate, acute: fr. subglobose, red, 1.5 cm. long, juicy. B.M. 6976. (*Cerasus J.* Buser.) N. W. Himal. Intr. 1879. Zone VI?—Handsome flowering shrub.

36. **P. japónica** Thunb. Shrub to 1.5 m.: brts. thin and slender: lvs. ovate or broad-ovate, rarely lance-ovate, acuminate, rounded at base, sharply doubly serrate, 3–7 cm. long, glabrous beneath or short-pubescent on the veins; petioles 2–3 mm. long: fls. 2–3, pink or nearly white, with the lvs.; pedicels 5–10 mm. long: fr. subglobose, about 1 cm. across or broad-ellipsoid, wine-red. S.Z.1:t.90,f.1,2(c). M.D.18:179,f.1. (*P. j.* var. *eujaponica* f. *Fauriei* Koehne.) Cent. China, E. Asia. Zone V.—Var. **Thunbérgii** Koehne. Lvs. cordate at base, long-acuminate, teeth longer and more pointed; glabrous beneath at maturity; pedicel 4 mm. long. (Var. *gracillima* f. *T.* Koehne.) Cult. 1910.—Var. **Engleri** Koehne. Lvs. similar to those of the preceding var., but short-pilose on veins beneath; pedicels usually 7–13 mm. long; fr. 1–1.5 cm. across. (Var. *gracillima* f. *E.* Koehne.) Manch. Intr. 1903.—Var. **Nakàii** Rehd. Lvs. pubescent beneath, slightly so or nearly glabrous above: pedicels and calyx pubescent to glabrous. N.K.5:t.22. (*P. N.* Lév.) Korea. Intr. 1918.—Var. **Kerii** Koehne. Lvs. glabrous beneath; pedicels 3 mm. long; fls. semidouble. B.R.27(c). B.M.2176(c). E. China. Intr. about 1808, probably not now in cult.

37. **P. glandulòsa** Thunb. Flowering Almond. Shrub to 1.5 m.: brts. glabrous, rarely puberulous: lvs. ovate-oblong or oblong to oblong-lanceolate, 3–9 cm. long, acute, rarely acuminate, broad-cuneate at base, crenate-serrulate, glabrous beneath or slightly hairy on midrib; petioles about 6 mm. long: fls. 1–2, pink or white; pedicels about 1 cm. long: fr. subglobose, 1–1.2 cm. across, red. B.M.8260(c). B.R.1801(c). (*P. japonica* Auth., not Thunb., *Cerasus g.* Lois.) C. and N. China, Japan. Intr. 1835. Zone V.—Var. **alba** Koehne. A white-fld. form of the type.—Var. **rosea** Koehne. Fls. pink. Tanaka, Usef. Pl. Jap. f.621(c). The type of the species.—Var. **albo-plèna**

Koehne. Fls. double, white. I.H.5:t.183. Oudemans, Neerl. Plantent. t.2(c). (*Cerasus jap.* var. *multiplex* Ser., in part, *P. jap. fl. albo-pleno* Lem.) Intr. about 1855?—Var. **sinénsis** Koehne. Lvs. lanceolate or oblong-lanceolate, short-pilose on the veins beneath or rarely glabrous; pedicels 1–1.5 cm. long, rarely very short; fls. double, pink. S.Z.1:t.90,f.3(c). (*P. jap. fl. roseo pleno* hort., *P. sinensis* Pers.) E. Asia. Cult. 1687. Zone VI.—Very ornamental and the double-flowered forms used for forcing.

38. **P. hùmilis** Bunge. Upright shrub to 1.5 m.; young brts. puberulous: lvs. obovate or elliptic, 2.5–5 cm. long, acute or short-acuminate, cuneate, serrulate, glabrous beneath; petioles about 3 mm. long: fls. 1–2, with the lvs., white or slightly pinkish, 1.5 cm. across; pedicels 6–8 mm. long: fr. subglobose, 1.5 cm. across, bright red, acid. B.M.7335(c). M.D.1909:180,f.3. (*P. Bungei* Walp.) N. China. Intr. 1881. Zone V.

39. **P. pùmila** L. Sand Cherry. Shrub to 2.5, with upright slender shoots, old stems often procumbent: young brts. glabrous, reddish: lvs. oblanceolate, 3–5 cm. long, acuminate or acute, cuneate, closely serrate, except toward the base, glabrous, dull green above, grayish white beneath; petioles 1–1.6 mm. long: fls. 2–4, about 1 cm. across, white; pedicels about 1 cm. long: fr. subglobose, about 1 cm. across, purple-black, lustrous, scarcely edible. G.O.t.119(c). L.B.1607(c). B.C.5:2833. M.G.19:57(h). W. N. Y. to Wisc. and Ill. Intr. 1756. Zone IV.—Var. **depréssa** Bean. Prostrate shrub: lvs. less acuminate, often obtusely spatulate, thinner, more glaucous beneath, teeth more crenate, veins less prominent; stipules less fimbriate: fr. globose-ellipsoid, edible. G.W.19:215(h). (*P. d.* Pursh.) N. B. to Ont. and Mass. Cult. 1864.—Var. **susquehànae** Jaeg. (excl. descript.). Upright shrub to 1.3 m.: lvs. obovate or elliptic, strongly serrate. B.C.5:2833. (Var. *cuneata* Bailey, *P. cuneata* Raf., *P. s.* Willd.) Me. to Pa., w. to Wisc. and Minn. Intr. 1805.—Planted for its early white fls.

P. p. × *cerasifera Pissartii* = **P. cistena** N. E. Hansen. Purpleleaf Sand-Cherry. Lvs. slightly pubescent along the midrib beneath near base, reddish like pedicels and calyx; petiole puberulous above; fls. 1–2, white: fr. blackish purple. M.D.1917:67,f.A. Orig. before 1910.—*P. p.* × *hortulana* and *P. p.* × *tomentosa* have been recorded.

40. **P. Bésseyi** Bailey. Western Sand Cherry. Similar to the preceding; stem usually prostrate: lvs. spreading, elliptic to elliptic-lanceolate, 2–6 cm. long, acute, appressed-serrate, glabrous; petioles 4–10 mm. long: fls. 2–4, white, 1.5 cm. across; pedicels about 8 mm. long: fr. subglobose, about 1.5 cm. across, purple-black, sweet. B.M.8156(c). B.C.5:2834. B.S.2:230. (*P. pumila* var. *B.* Waugh, *P. prunella* Daniels.) Man. to Wyo., s. to Kans. and Colo. Intr. 1892. Zone IV or III.—Cult. for its fr.; also ornamental in bloom.

P. B. × *angustifolia* var. *Watsonii* = **P. utahensis** Dieck. Lvs. elliptic to elliptic-oblong or oblong-obovate, 3.5–6 cm. long, finely serrulate, lustrous above, reticulate beneath: fr. slightly bloomy, dark brownish red. S.H.1:f.345m-n. Orig. about 1865. Zone IV.—*P. B.* × *tomentosa* has been recorded.

Sect. 2. Pseudocerasus Koehne. Sepals upright or spreading: calyx-tube usually cylindric: fls. in fascicles or short few-fld. racemes.

41. **P. canéscens** Bois. Shrub with spreading brs., to 2 m.; brts. pubescent: lvs. ovate to ovate-lanceolate, 2.5–6 cm. long, abruptly acuminate, rounded at base, doubly serrate with abruptly acuminate teeth, pubescent above, densely grayish pubescent beneath; petioles 5–10 mm. long; stipules dentate, about ½ as long as petiole: infl. with leafy bracts; fls. 2–5, pinkish, about 1 cm. across; pedicels 5–10 mm. long; pilose like the calyx; sepals triangular, serrate, half as long as tube; petals caducous, oblong-obovate: fr.

subglobose, 1–1.2 cm. across, red. F.V.66(h),67. C. and W. China. Intr. 1898. Zone V.—Distinct shrub, but of little ornamental value.

A related species is **P. stipulâcea** Maxim. Lvs. oblong-lanceolate or obovate-lanceolate, 4–6.5 cm. long, glabrate except bearded in the axils beneath, with 7–10 pairs of veins; stipules about as long as petiole, coarsely serrate: fls. solitary, short-stalked; calyx glabrous; stone rugulose. N. W. China. Intr. 1873. Zone V?—A related species is **P. apétala** Franch. & Sav. Shrub or small tree; brts. villous at first: lvs. oblong or obovate-oblong, 3–5 cm. long, long-acuminate, incisely doubly serrate, densely pubescent on both sides: fls. 1–2, with the lvs.; calyx-tube villous, purple; petals small, fugacious; pedicels pilose. . S.I.2:t.28,f.14–19. (*P. Ceraseidos* Maxim.) Japan. Intr. 1915. Zone V?

42. **P. incìsa** Thunb. Shrub or sometimes tree to 10 m.; brts. glabrous: lvs. purplish when unfolding, ovate to obovate, 3–5.5 cm. long, acuminate, incisely doubly serrate, pubescent above and beneath on the veins; petioles slender, 8–10 mm. long, pubescent, fls. 1–3, nodding, white to pale pink; pedicels short or sometimes elongated with leafy bracts at base; calyx vinous-red, usually glabrous; petals fugacious: fr. ovoid, 6–8 mm. long, purple-black. S.H.1:f.339g,340o. Wilson, Cherr. Jap. t.5(h). (*Cerasus i.* Lois.) Cult. 1910. Zone V.—Early flowering shrub.—Var. **serràta** Koidz. Lvs. less distinctly biserrate or almost simply serrate, with long-aristate teeth. Intr. 1915.—Var. **Yamadei** Mak. Young lvs., pedicels and calyx green; style greenish. Intr. about 1918.

43. **P. nippónica** Matsum. Bushy tree to 6 m.; brts. glabrous, chestnut-brown; lvs. ovate, 4–9 cm. long, long-acuminate, usually rounded at base, incisely doubly serrate, pubescent while young, chiefly on veins, finally nearly glabrous; petioles glabrous: fls. 1–3, white or pale pink, 2–2.5 cm. across; pedicels 1.5–2.5 cm. long, glabrous; calyx-tube campanulate or funnelform, glabrous; petals elliptic-oblong to roundish-obovate, rounded or emarginate: fr. globose, about 8 mm. across, black. S.I.2:t.28(c, as *P. incisa*). (*P. iwagiensis* Koehne, *P. nikkoensis* Koehne.) Japan. Intr. 1915. Zone V.—Var. **kurilênsis** Wils. Petioles pubescent: fls. somewhat larger; pedicels and calyx-tube slightly pubescent. (*P. k.* Miyabe.) Japan, Kurile Isls. Intr. 1905. Zone V.—Very ornamental and handsome Cherry.

44. **P. lobulàta** Koehne. Tree to 10 m., young brts. slightly pubescent: lvs. obovate to oblong-obovate or oblong-lanceolate, 3–8 cm. long, acuminate, cuneate to rounded at base, incisely doubly serrate with strongly acuminate teeth, nearly glabrous above, pilose on veins beneath: fls. white, 1–3; pedicels 1.5–2 cm. long, in fr. to 2.5 cm., glabrous; calyx-tube funnelform; sepals ovate-oblong, shorter than tube, glandular-serrate, upright; petals obovate; style pilose toward base: fr. subglobose, about 1 cm. across, red; stone ovoid, ribbed, 8–10 mm. long. W. China. Intr. 1908. Zone V?

Closely related species are: **P. glyptocárya** Koehne. Differs chiefly in its larger lvs. 6–11 cm. long, in its red-brown fr. with the stone roundish about 8 mm. long, reticulate-ribbed or ribbed. W. China. Intr. 1908. Possibly only var. of preceding.—**P. pleurôptera** Koehne. Differs chiefly in its smaller lvs. 2–6 cm. long, in its black fr. with roundish foveolate stone about 7 mm. long; pedicels about 1 cm. long. W. China. Intr. 1908.

45. **P. subhirtélla** Miq. Small, much-branched tree to 10 m.; young brts, pubescent: lvs. ovate to oblong-ovate, 3–7 cm. long, acuminate, sharply and often doubly serrate, pubescent on the veins beneath, with about 10 pairs of veins; petioles pubescent, about 6 mm. long: fls. 2–5, light pink, 1.8 mm. across; calyx-tube cylindric, pubescent; pedicels about 8 mm. long; petals emarginate: fr. about 8 mm. across, black. B.M.7508(c). M.D.1917:42. M.G.15:320(h). S.L.308(h). Wilson, Cherr. Jap. t.1(h). (*P. Miqueliana* Maxim., in part, *P. pendula* var. *ascendens* Rehd., not Mak.) Japan. Intr.

1894. Zone V.—Var. **ascéndens** Wils. Large tree to 20 m., rather sparingly branched: lvs. usually elliptic-oblong, 6–10 cm. long. Wilson, Cherr. Jap. t.3(h). M.D.1917:42a[1]–e[1]. (*P. pendula* var. *a.* Mak., *P. microlepis* Koehne, *P. Herincqiana* Koehne.) Japan. Cult. 1916.—Var. **péndula** Tanaka. Tree with slender pendulous brs.: lvs. similar to the preceding var., but broader; calyx-tube glabrescent. B.M.8034(c). L.I.35. Gn.50:454,t.(c). G.F.1:196; 2:487. M.G.15:319(h). S.L.309(h). (*P. p.* Maxim., *P. itasakura* Sieb., *P. Herincqiana* Schneid.) Japan. Intr. 1862. Zone V.—Var. **autumnàlis** Mak. Shrub or bushy tree to 5 m.: fls. semidouble, appearing partly late in autumn and partly in spring. Gn.76:628;85:502;89:344(h). J.H.38:f.204(h). G.C. III.77:71(h). (*P. microlepis* var. *Smithii* Koehne, *P. microlepis* Bean, not Koehne, *P. Miqueliana* Hort., not Maxim.) Cult. in Japan. Intr. before 1909. Zone V.—Handsome and free-flowering tree; much cult., particularly v. *pendula*.

46. **P. campanulàta** Maxim. Small tree to 8 m.; young brts. glabrous: lvs. ovate to elliptic-ovate or ovate-oblong, 4–10 cm. long, acuminate, closely and doubly or nearly simply serrate, with short teeth pointing forward, glabrous; pedicels slender, about 1 cm. long, glandular: fls. pendulous, deep rose, campanulate; calyx-tube deep rose, glabrous; pedicels 5–20 mm. long: fr. ovoid, 1.5 cm. long, red; stone smooth. Gn.56:t.1244(c, as *P. pendula*). S.H.1:f.339d-d[1]. J.C.28,1:t.2,f.6–12;34,2:264. (*P. ceraseidos* var. *c.* Koidz.) S. Japan, Formosa. Cult. 1899. Zone VII?—Very beautiful Cherry, but probably not perfectly hardy.

A closely related species is **P. ceraseìdos** Don. Lvs. more coriaceous and more sharply toothed, roundish-oval: fr. apiculate. Wallich Pl. As. Rar.2:t.143. S.H. 1:f.339a,340f. Himal. Tender. Intr. ?

47. **P. rùfa** Hook. f. Tree to 7 m.; young brts. rufous-tomentose: lvs. elliptic-oblong to oblong-lanceolate, 5–10 cm. long, sharply serrate with gland-tipped teeth, pubescent on the veins beneath while young; petioles 1 cm. long: fls. 1 or few, pink; pedicels 1–2.5 cm. long; calyx-tube tubular-campanulate, glabrous; sepals triangular, serrate: fr. broad-ellipsoid. S.H.1:f. 339n-n[1],340l.[1] (*Cerasus r.* Wall.) Himal. Intr. 1897. Zone VI or VII.

A closely related species is **P. trichántha** Koehne. Infl. pubescent. Sikkim. Intr. 1897.

48. **P. sérrula** Franch. Of this only var. **thibetica** Koehne is in cult. Tree to 10 m., with flaky brown bark; young brts. finely pubescent: lvs. lanceolate, 4–10 cm. long, long-acuminate, rounded at base, doubly serrulate, pubescent along the midrib beneath and bearded in the axils; petioles about 1 cm. long, with 3–4 glands: fls. 1–3, white; pedicels about 1 cm. long; calyx-tube glabrous, green; sepals ovate-triangular, glandular-denticulate; petals round-ovate, 8 mm. long, rounded or tricuspidate at apex: style finely pubescent below the middle: fr. oval, 1–1.3 cm. long, red; stone strongly reticulate-ribbed. W. China. Intr. 1908. Zone V.—Fls. usually sparingly produced, with the lvs.

49. **P. concínna** Koehne. Shrub to 2 m.; young brts. sparingly pilose, soon glabrous: lvs. purplish when unfolding, narrow-elliptic to oblong-ovate or oblong-obovate, 3–6 or on shoots to 8 cm. long and lance-oblong, acuminate, rounded or cuneate at base, sharply and rather finely or sometimes doubly serrate, dull green and usually sparingly hairy above, grayish green beneath and sparingly hairy chiefly on the veins, at maturity sometimes nearly glabrous: petioles 3–8 mm. long, sparingly pubescent: fls. 1–4, white, 2–2.5 cm. across; pedicels 8–15 mm. long, sparingly pubescent or glabrous; calyx-tube tubular, glabrous; sepals ovate to ovate-oblong, entire; petals

narrow-obovate, often emarginate: fr. subglobose, 1–1.2 cm. long; stone ovoid, smooth or nearly so. C. China. Intr. 1907. Zone V.—Handsome shrub; fls. in great profusion before the lvs.

50. **P. Conradìnae** Koehne. Tree to 8 m.; young brts. glabrous: lvs. obovate to obovate-oblong, rarely broad-ovate, 5–10 cm. long, abruptly acuminate, usually rounded at base, deeply or in the middle doubly serrate, glabrous above, hairy on the veins beneath at first, finally glabrescent or glabrous, with 9–12 pairs of veins; petiole 1–1.5 cm. long, glabrous: fls. before the lvs., 1–4, whitish or pinkish, about 2 cm. across; pedicels 5–18 mm. long; bracts caducous; calyx-tube tubular-campanulate; sepals ovate, entire; petals emarginate: fr. oval, about 1 cm. long, red; stone smooth. Gn.87:97. C. China. Intr. 1907. Zone VI?—Var. **semiplèna** Ingram. Fls. semidouble. G.C.III.77:217. Orig. before 1925.

Closely related species are: **P. Hélenae** Koehne. Lvs. sharply and deeply doubly serrate: petals ovate, acute, white. C. China. Intr. 1907?—**P. Sprèngeri** Pamp. Calyx-tube finely pubescent; style pubescent below. C. China. Cult. 1900.

51. **P. Lannesiàna** Wils. Tree to 10 m.; brts. pale gray, glabrous: lvs. ovate to oblong-ovate, rarely obovate, 6–13 cm. long, abruptly caudate-acuminate, sharply and doubly serrate with long-aristate teeth, green or slightly reddish when unfolding, pale green beneath at maturity or slightly glaucescent, glabrous; petioles 1–2.5 cm. long, with 1 or 2 or without glands: fls. 2–5, pink or white, fragrant, usually racemose with leafy bracts; peduncle usually 2–4 cm. long, sometimes nearly wanting; pedicels 0.5–2 cm., in fr. to 3 cm. long; calyx-tube campanulate, glabrous: fr. ovoid, black and lustrous. B.M.8012(c). R.H.1873:351,t(c). Gn.4:274. G.C.III.19:466 (as *P. pseudocerasus*). M.D.1917:26a[1]–e[1]. (*P. serrulata* f. *Lannesiana* Koehne, *Cerasus L.* Carr.) Japan. Intr. before 1870. Zone V or VI. The typical form has pink fls.—Var. **álbida** Wils. Fls. white. Wilson, Cherr. Jap. t.7(h). J.C.34,2:272, f.7. Tokyo B.M.26:115, 118.—Var. **donàrium** Wils. Fls. double white. Gn. 56:5.—Var. **subfúsca** Wils. Fls. very large, flushed pink. J.C.34,1:t.10.f.35(c). (f. *sumizome* Wils.)—Var. **contórta** Wils. Fls. pale pink, passing to white, double, clustered at end of brts. J.C.34,1:t.4,f,8,t.15,f.3(c). (f. *fukurokuju* Wils.)—Var. **hatazakùra** Wils. Fls. white tinged with pink, semidouble; very handsome. J.C.34,1:t.10,f.39(c).—Var. **affìnis** Wils. Fls. pure white, single or semidouble (f. *jonioi* Wils.).—Var. **siròtae** Wils. Fls. pure white, double or semidouble, large; the finest of all double white Cherries. J.C.34,1:t.10, f.38(c).—Var. **erécta** Wils. Fls. pale pink, semidouble; brts. fastigiate. J.C. 34,1:t.5,f.10,t.20,f.87(c). (f. *amanogawa* Wils.)—Var. **moùtan** Wils. Fls. very large, pale pink, semidouble. J.C.34,1:t.11,f.43(c). (f. *botanzakura* Wils.)—Var. **ochichima** Wils. Fls. large, pale pink, double. G.W.6:354.—Var. **ojochin** Wils. Fls. semidouble, pale pink, very large. J.C.34,1:t.11,f.22 (c).—Var. **grandiflòra** Wils. Fls. greenish yellow, double or semidouble. Gt. 52:t.1513,f.a(c). Gn.76:229. J.C.34,1:t.21,f.88(c). (*P. serrulata* f. *viridiflora* Mak., f. *grandiflora* Wagn., *P. pseudocerasus* f. *virescens* Koehne.)—The forms enumerated above are some of the most beautiful kinds of Japanese Cherries.

52. **P. serrulàta** Lindl. Tree to 25 m.; bark smooth, dark chestnut-brown; brts. glabrous: lvs. ovate to ovate-lanceolate, 6–12 cm. long, abruptly long-acuminate, serrate or often doubly serrate with short-aristate teeth, greenish brown when unfolding, glaucescent beneath; petioles 1.5–3 cm. long, with 2–4 glands, glabrous: fls. white, 3–5, usually racemose with leafy

bracts, inodorous; calyx-tube campanulate; sepals ovate, acute; style glabrous: fr. black. (*Cerasus s.* Don, *C. serratifolia* Carr., *P. pseudocerasus* hort. not Lindl.) Japan, China, Korea. The typical form, var. **alboplèna** Schneid. has white double fls. Gn.56:300,t(c). G.C.III.7:609;19:467. R.H.1877:389, t.f.2(c). (F. *mucronata* Koehne.) Intr. from China before 1830. Zone V.—Var. **rôsea** Wils. Fls. pink, rather small, very double. R.H.1877:389,t.(c). (F. *shidare-sakura* Koehne.)—The following garden forms are considered by Wilson forms of var. *sachalinensis*: Var. **albo-rôsea** Wils. Fls. double, pink in bud, changing to white, with 2 green leafy carpels in the centre. H.B.3: 189(h). W.A.34,t(h).—Var. **fugénzo** Wils. Fls. double, rose-pink, with 2 leafy carpels in the centre. G.C.III.19:517. J.C.34,1:t.3,f.5(h),t.18,f.78(c). (Var. "James Veitch," f. *Veitchiana* Koehne.)—Var. **hisâkura** Koehne. Fls. double, pale pink. Gt.51:t.1494,f.b(c). G.W.16:354. J.C.34,1:t.18,f.80(c).—Var. **horínji** Wils. Fls. double or semidouble, pale pink, in clusters. F.S.21: t.2238(c). J.C.34,1:t.15,f.60(c).—Var. **sekiyàma** Wils. Fls. rich rose-red, double, large, late. J.C.34,1:t.3,f.6(h),t.18,f.77(c).—Var. **supérba** Wils. Fls. pale pink, double, very large, long-pediceled. J.C.34,1:t.16,f.69(c). (F. *shogetsu* Wils.)—Var. **spiràlis** Wils. Fls. pink, double, very freely produced at ends of shoots. (F. *udzuzakura* Wils.)—The following three spontaneous varieties have been distinguished: Var. **spontànea** Wils. Fls. single, 1.5–2.5 cm. across, white or pink, in usually short-peduncled 2–3-fld. racemes: lvs. glabrous with acuminate scarcely aristate teeth. S.I.2:t.27,f.1–14(c). Gn. 10:89 (as var. *Ungeri*). (*P. pseudocerasus* var. *spontanea* Maxim., *P. tenuiflora* Koehne, partly.) Japan, Korea, China. Intr. 1900. Zone V.—Var. **pubéscens** Wils. Similar to the preceding var.: lvs. pale green beneath and sparingly pubescent; petioles pubescent, often only so above; pedicels usually slightly pubescent. J.C.34,2:269. (*P. Levcilleana*, *P. mesadenia* Koehne, *P. Veitchii* Koehne, *P. quelpartensis* Nakai.) Japan, Korea, China. Intr. 1907. —Var. **sachalinénsis** Mak. Tree to 25 m.: lvs. glabrous, glaucescent beneath with acuminate, scarcely aristate teeth: fls. pink or rose-colored, rarely white, 2.5–4 cm. across, in sessile or subsessile clusters of 2–3; pedicels 1–2 cm. long. B.M.8411(c). G.F.10:463. G.C.III.19:517;55:346. B.C.5:2838. S.L. 294(h). Wilson Cherr. Jap. t.6(h). (*P. Sargentii* Rehd., *P. pseudocerasus* var. *s.* F. Schmidt.) Japan, Saghal. Intr. 1890. Zone V.—The var. *sachalinensis* and the double-fld. garden forms are very handsome, free-flowering Cherries; var. *spontanea* and var. *pubescens* are less ornamental.

53. **P. yedoénsis** Mats. Tree to 16 m., with smooth, pale gray bark; young brts. slightly pubescent: lvs. elliptic-ovate to obovate, 6–12 cm. long, acuminate, strongly doubly serrate with acuminate teeth, glabrous above, pubescent on the veins beneath, light green beneath and green when unfolding; petioles pubescent: fls. white to pink, slightly fragrant, in 5–6-fld. short-peduncled racemes; calyx-tube cylindric, pubescent; pedicels pubescent; style pubescent or nearly glabrous: fr. globose, black. B.M.9062(c). N.K.5:t.8. Wilson, Cherr. Jap. t.4(h). Cult. in Japan, supposed to be a hybrid between *P. Lannesiana* and *P. subhirtella*. Intr. 1902. Zone V.—Var. **perpéndens** Wils. Brs. pendulous, very long: pedicels and calyx hairy. Intr. 1910 from Japan.—Var. **nudiflôra** Koehne. Calyx and pedicels glabrous or nearly so.—Var. **shojo** Wils. Fls. double, rosy pink, large.—Var. **taizanfukun** Wils. Fls. double, pink, of medium size. Icon. Fl. Jap. 1:t.15. J.C.34,1:t.5,f.9(h), t.16,f.70(c).

54. **P. Sieb**ó**ldii** Wittm. Small tree, to 8 m., with smooth gray bark; young brts. glabrous; lvs. elliptic to ovate, 6–12 cm. long, abruptly long-

acuminate, rounded at base, sharply and often slightly doubly serrate with small teeth, densely pubescent on both sides; petioles pubescent, usually with 1 or 2 small glands: fls. about 3 cm. across, double or sometimes single, pink or sometimes white, 2–4 on a short peduncle; pedicels pubescent; calyx-tube turbinate, or short-campanulate, pubescent, about as long as the ovate obtuse lobes; style usually hairy at base. R.H.1866:371,t.(c). Gt.51:t. 1494a(c). Gn.33:420. L.I.t.36. G.W.16:355. Wilson, Cherr. Jap. t.8(h). (*P. pseudocerasus* var. *S.* Maxim., *P. pseudocerasus* f. *Watereri* Koehne.) Cult. in Japan. Intr. 1864. Zone V.

Sect. 3. Lobopetalum Koehne. Lvs. with acute or acuminate teeth: fl. in sessile umbels or 2–6-fld. stalked umbel-like racemes; petals deeply emarginate or 2-lobed.

55. **P. pseudocérasus** Lindl. Tree to 8 m.; young brts. glabrous or slightly pubescent: lvs. broad-ovate to oblong-ovate, 7–16 cm. long, acuminate, rounded at base, doubly serrate with ovate short-acuminate teeth, glabrous above at maturity, sparingly pubescent on the veins beneath or nearly glabrous; petioles glabrous or pubescent, 8–15 mm. long: fls. before the lvs. white, 3–6 in sessile clusters or in peduncled pubescent racemes; calyx-tube broad-obconic, pubescent; petals ovate to suborbicular, emarginate; style glabrous: fr. subglobose, red, about 1 cm. across, edible. B.R.t.800(c). L.A. 2:f.407. M.D.1917:7. Gn.89:701. (*P. paniculata* Ker, not Thunb., *P. involucrata* Koehne, *P. pauciflora* Bge.) China, cult. in Japan. Intr. 1819. Zone VII? Has been much confused with *P. serrulata* and *P. Siboldii*.

56. **P. Dielsiàna** Schneid. Shrub or tree to 10 m.; young brts. glabrous: lvs. oblong-obovate to oblong, 8–14 cm. long, abruptly acuminate, broad-cuneate to subcordate at base, simply or doubly serrate with short-acuminate teeth, glabrous above, thinly villous beneath, more densely on veins, with 10–12 pairs of veins; petioles 8–16 mm. long, villous or nearly glabrous, with 1–3 glands: fls. before the lvs. pink or white, 3–5, umbellate, surrounded by a large involucre; bracts glandular-fimbriate; pedicels 1–3.5 cm. long, villous; calyx-tube short-campanulate, villous; sepals oblong to lanceolate, entire; petals oval, 1–1.4 cm. long; style glabrous: fr. globose, about 8 mm. across, red; stone smooth. C. China. Intr. 1907. Zone VI?

A closely related species is **P. cyclámina** Koehne. Lvs. glabrous beneath or pilose only on the veins; petioles glabrous: fls. coetaneous, pink; calyx-tube glabrous; petals oblong. C. China. Intr. 1907. Zone (V).

Sect. 4. Eucerasus Koehne. Lvs. dentate with obtuse teeth: fls. in sessile umbels, rarely short-racemose, surrounded at base by the persistent bud-scales.

57. **P. ávium** L. Mazzard. Tree to 24 m., of pyramidal habit; brts. stout: lvs. oblong-ovate, 6–15 cm. long, acuminate, unequally serrate, dull and often slightly rugose above, more or less pubescent beneath, of soft texture; petioles to 7 cm. long: fls. white, in several-fld. umbels, 2.5–3.5 cm. across; scales of fl.-buds rather large, reflexed at anthesis; calyx-tube glabrous, constricted at apex; sepals usually entire: fr. subglobose or ovoid, about 2.5 cm. across. S.E.3:t.411(c). H.W.3:90,t.55(c). R.I.25:t.93(c). Gn.78: 242(h). M.A.t.25(h). (*Cerasus a.* Moench.) Eu., W. Asia. Cult. since ancient times; intr. to N. Am. between 1621 and 1629. Zone IV.—Var. **aspleniifòlia** Jaeg. Lvs. deeply incised.—Var. **salicifòlia** Dipp. Lvs. narrow. —Var. **decumàna** K. Koch. Lvs. very large, to 25 cm. long. (*P. macrophylla* Poir.)—Var. **plèna** Schneid. Fls. double. Hedrick, Cherr. N. Y. 30,t(c). G.W.6:329. Gn.78:242;83:94(h). S.L.310(h). (Var. *fl. pleno* Hort., *Cerasus a.* var. *multiplex* Ser.)—Var. **péndula** Jaeg. Brs. pendulous. Gn.59:267(h).— Var. **nàna** Bean. Dwarf form.—Var. **Juliàna** W. Koch. Heart-Cherry

(Gean-Cherry). Fr. ovoid, heart-shaped, with soft flesh, usually dark-colored. (*P. Cerasus* var. *J.* L.)—Var. **durácina** W. Koch. Hard-fleshed Cherry (Bigarreau). Fr. with hard flesh, usually light-colored.—The wild form with small purple-black sweet fr. has been distinguished as var. **actiàna** Schneid. (*P. Cerasus* var. *a.* L., *P. avium* var. *sylvestris* Dierb.)—Much cultivated for its fr. in many pomological vars.; some forms planted for ornament.

P. a. × *Cerasus* = **P. effùsa** Schneid. Duke Cherry. Similar to the Heart-Cherry but with sour flesh. R.I.25:t.92,f.34(c). Hedrick, Cherr. N. Y.31,t(c). (*P. avium* var. *regalis* Bailey, *P. capproniana* Zabel, *Cerasus e.* Host.)—*P. a.* × *mahaleb* = **P. Fontanesiàna** Schneid. Similar to *P. avium*, with slightly pubescent brts., smaller and broader lvs. less than 10 cm. long, often rounded or subcordate at base: infl. 4–10-fld. often slightly racemose; fls. 2 cm. across: fr. small, dark red, somewhat bitter. G.W.7:497(h). S.L.311(h). (*P. graeca* Desf., *Cerasus F.* Spach.) Orig. before 1829.

58. **P. Cérasus** L. Sour Cherry. Usually round-headed tree to 10 m., with often slender, spreading and pendulous brs., suckering; young brts. glabrous: lvs. elliptic-obovate to ovate, 5–8 cm. long, acute, finely and often doubly serrate, resinous when young, slightly pubescent beneath, of firm texture; petioles 1.5–5 cm. long: fls. with the lvs., about 2.5 cm. across, in dense clusters; the inner bud-scales often upright and leafy; pedicels 1–3.5 cm. long; calyx-tube obconic, sepals usually serrulate: fr. usually depressed-globose, depressed at apex. R.I.25:t.91(c). S.E.3:t.412(c). Gn.79:236;83:94(h). W. Asia, S. E. Eu. Cult. since ancient times. Zone V.—Var. **plena** L. Fls. semidouble. (*P. acida fl. pleno* Kirchn., f. *semiplena* Schneid., *Cerasus capproniana* var. *multiplex* Ser.)—Var. **Rhexii** Voss. With double white fls. F.S.17:t.1805(c). Gn.78:228;81:184;83:94. (F. *ranunculiflora* Voss.)—Var. **persiciflòra** Jaeg. Fls. double, light rose or pink. F.S.21:2238(c). (*Cerasus capproniana* var. *p.* Ser., var. *fl. roseo pleno* Van Houtte.)—Var. **salicifolia** Jaeg. Lvs. 8–13 cm. long, 1.5–3 cm. wide, rather coarsely doubly serrate. Cult. 1874.—Var. **umbraculífera** Jaeg. Small-lvd. form of compact roundish habit. Gn.78:201(h). (Var. *dumosa* Dipp., var. *globosa* Spaeth.)—Var. **frutéscens** Schneid. Shrubby small-fruited form. (Var. *humilis* Bean.) Occurs wild or escaped.—Var. **marásca** Schneid. Lvs. slightly serrate; stipules persistent; pedicels short, to 2.5 cm. long. (*P. m.* Reichb., *P. intermedia m.* Zabel).—Var. **semperflòrens** Koch. All Saints Cherry. Small tree or shrub: lvs. elliptic to oblong-obovate, irregularly serrate: fls. in 4-fld. racemes at the end of short leafy brts. during the summer. R.H.1877:50,t.(c). B.C. 5:2837. (*P. s.* Ehrh.)—Var. **austèra** L. Morello Cherry. Frs. dark, with colored juice. Hedrick, Cherr. N. Y. 26,t(c). 140,t(c), 178,t(c).—Var. **capproniàna** L. Amarelle Cherry. Fr. light-colored with uncolored juice. Hedrick, Cherr. N. Y. 24,t(c),132,t(c),170,t(c). (*P. acida* Ehrh.)—Often grown for its fr. and some forms for their ornamental fls., particularly the double-fld. forms. It is one of the few fruit-trees suited for shady situations.

P. C. × *fruticosa* = **P. éminens** Beck. Intermediate between the parents. R.I.25:t.92,f.1–2(c). (*P. intermedia*, Host., not Poir.)—Possibly *P. reflexa* Hort., not Gardn. belongs here and may be *P. Cerasus semperflorens* × *fruticosa;* it is similar to *P. fruticosa pendula*, but lvs. larger and more serrate than in that form.

59. **P. fruticòsa** Pall. Ground Cherry. Spreading shrub, to 1 m.; brts. slender, glabrous: lvs. elliptic-obovate to obovate-oblong, 2–5 cm. long, obtusish to short-acuminate, crenate-serrulate, glabrous and dark glossy green, thickish; petioles 5–12 mm. long: fls. 2–4, in usually sessile umbels, white, 1.5 cm. across; pedicels 1.5–2.5 cm. long; sepals broad, obtuse: fr. dark red, globose, about 1 cm. across. R.I.25:t.90(c). H.W.3:92. (*P. chamaecerasus* Jacq., *P. intermedia* Poir.) C. and E. Eu. to Siberia. Cult. 1587. Zone IV.

—Var. **pendula** Dipp. With slender pendulous brts. G.W.10:511(h). B.C. 5.2836(h). S.L.312(h). (*P. chamaecerasus salicifolia* Zabel.)

Sect. 5. Mahaleb Focke. Lvs. crenulate or serrulate: fls. in umbels or few–12-fld. racemes, their basal bud-scales deciduous before anthesis; bracts deciduous.

60. **P. máhaleb** L. Mahaleb Cherry. Tree to 10 m., with short stem and spreading brs. forming a loose head; young brts. tomentulose: lvs. orbicular to broad-ovate, 3–6 cm. long, obtusely short-acuminate, rounded or subcordate at base, callously serrulate, pubescent along the midrib beneath, otherwise glabrous; petioles 1–2 cm. long: fls. white, 1.5 cm. across, fragrant, in 6–10-fld. racemes 3–4 cm. long, with small leaf-like bracts at base; sepals ovate, entire, shorter than calyx-tube: fr. about 6 mm. across, black. H.W. 3:t.57(c). R.I.25:t.94(c). S.L.312(h). B.S.2:242(h). (*Cerasus m.* Mill.) Eu., W. Asia. Long cult. Zone V.—Var. **xanthocárpa** Rehd. Fr. yellow. Gn.62:181(h). (Var. *chrysocarpa* Nichols.)—Var. **péndula** Dipp. Brs. pendulous. G.M.44:210(h).—Var. **monstròsa** Jaeg. Dwarf and compact form with short thick brts. (*Cerasus m.* var. *m.* Kirchn.) Var. *globosa* Dieck and var. *compacta* Spaeth are probably scarcely different.—Used as stock for grafting Cherries and on account of the aromatic bark for the manufacture of pipe-stems.

61. **P. pennsylvánica** L. Wild Red Cherry. Shrub or small tree to 12 m.; brts. glabrous, slender, reddish and shining: lvs. ovate to oblong-lanceolate, 6–11 cm. long, long-pointed, finely and sharply serrulate, glabrous; petioles 1–2 cm. long: fls. white, 1.2 cm. across, in 2–5-fld. umbels or short racemes often several together; pedicels 1–1.5 cm. long, glabrous; sepals ovate, obtuse, entire, shorter than calyx-tube: fr. globose, 6 mm. across, red. B.M.8486(c). S.S.4:t.156. (*P. persicifolia* Desf., *Cerasus p.* Loisel., *Cerasus borealis* Michx.—Pin Cherry.) Nfdl. to B. C., south to N. C. and Colo. Intr. 1773. Zone I–II.—Var. **saximontàna** Rehd. Usually shrubby: lvs. elliptic-ovate to elliptic-oblong, less acuminate, pale green: umbels with fewer fls. Rocky Mtn. region. Intr. 1882.—Handsome in bloom and attractive with its numerous red frs. in summer.

62. **P. emarginàta** Walp. Shrub or small tree to 4 m.; young brts. slightly pubescent, soon glabrous: lvs. obovate-oblong to oblanceolate, 3–6 cm. long, usually obtuse or emarginate, cuneate, finely crenulate-serrulate, glabrous above, slightly pubescent or finally glabrous beneath; petioles 6–10 mm. long: fls. dull white, 1 cm. across, in 5–10-fld. clusters or short racemes; pedicels 6–10 mm. long, slightly pubescent; sepals entire, rounded, shorter than calyx-tube, slightly pubescent: fr. globose, about 1 cm. across, red finally black. (*Cerasus e.* Dougl.) Ore. and Cal. to Idaho and Ariz. Intr. 1918. Zone V or VI.

A closely related species is **P. mollis** Walp. (not Torr.). Shrub or tree to 12 m.; young brts. densely pubescent: lvs. obovate or oblong, to 8 cm. long, acute to obtuse, slightly pubescent or nearly glabrous above, pubescent beneath: calyx-tube pubescent. S.S.4:t.157(as *P. emarginata*). (*Cerasus Pattoniana* Hort., *P. prunifolia* Shafer.) B. C. to Calif. Intr. 1865. Zone VI?

Sect. 6. Phyllocerasus Koehne. Lvs. with acuminate or acute teeth: fls. in 1–4-fld. umbels with persistent leafy bracts at base.

63. **P. pilosiúscula** Koehne. Shrub or tree to 12 m.; young brts. glabrous or pilose: lvs. obovate to oblong-obovate, 4–8.5 cm. long, acuminate, usually rounded at base, sharply and doubly serrate, the teeth without or with small glands, glabrous above, pubescent beneath on the veins; petioles 6–12 mm. long: fls. 1–3, about 2 cm. across, coetaneous; bracts oblong or rotundate, 5–8 mm. long, glandular-serrate; pedicels 1–3 cm. long, glabrous or slightly

villous; calyx-tube glabrous; petals oval; style villous except at upper third: fr. ellipsoid, 8–9 mm. long, red. C. and W. China. Intr. 1907. Zone V or VI.—Var. **barbàta** Koehne. Lvs. glabrous beneath except axillary tufts of hairs.

Related species are: **P polýtricha** Koehne. Young brts. densely villous: lvs. caudate, the teeth setosely acuminate, pubescent beneath; calyx-tube densely villous; sepals acute; styles pilose at base: fr. oval, about 8 mm. long, red. C. China. Intr. 1907.—**P. tatsienénsis** Batal. Glabrous: lvs. abruptly caudate, the teeth with large terminal conical glands: bracts of infl. glandular-dentate: fr. globose, about 1 cm. across, brownish red. Only var. **stenadènia** Koehne from W. China in cult.: glands of teeth of the bracts narrow-oblong, not disciform as in the type. Intr. 1910.

Sect. 7. PHYLLOMAHALEB Koehne. Lvs. with acuminate to acute teeth: fls. in 4–9-fld. stalked racemes with leafy persistent bracts.

64. **P. Maximowíczii** Rupr. Tree to 16 m., with spreading brs.; young brts. pubescent: lvs. obovate or elliptic-obovate, 4–8 cm. long, abruptly short-acuminate, rounded at base, coarsely doubly serrate, bright green with scattered hairs above, pubescent on the veins beneath; petioles 8–12 mm. long, pubescent: fls. shortly after the lvs., about 1.5 cm. across, yellowish white, in 6–10-fld. stalked racemes, with large leaf-like bracts; pedicels 1.5 cm. long, pubescent; sepals acute serrate; style glabrous: fr. globose, about 5 mm. across, first red then black. B.M.8641(c). S.I.2:t.30,f.1–9(c). N.K.5:t.5. G.F.6:195. Manch., Korea, Japan. Intr. 1892. Zone IV.—Planted for its pleasing bright green foliage turning scarlet in autumn.

P. M. × *Maackii* = *P. Meyeri;* see under No. 74.

Related species all differing in the large glands of the teeth of the lvs. and bracts are the following: **P. conadènia** Koehne. Tree to 10 m.; brts. glabrous: lvs. obovate, 4–9 cm. long, caudate-acuminate, subcordate or rounded at base, doubly serrate, the teeth with conical glands, glabrous or nearly so beneath: racemes 5–8-fld., glabrous; pedicels 5–15 mm. long; style villous: fr. ovoid, red; stone sculptured. W. China. Intr. 1908.—**P. pleiocérasus** Koehne. Tree to 8 m.; brts. glabrous: lvs. obovate-oblong to oblong, 4–9 cm. long, caudate-acuminate, rounded or cuneate at base, unequally serrate with conical glands, glabrous beneath; racemes 5–7-fld., glabrous; pedicels 1–2.2 cm. long; style with few hairs at base: fr. globose, red or nearly black; stone sculptured. W. China. Intr. 1908.—**P. macradènia** Koehne. Tree to 10 m.; brts. glabrous: lvs. ovate or elliptic-ovate, 4.5–6.5 cm. long, caudate, cuneate or rounded at base, simply or doubly serrate, the teeth with conical glands, pubescent beneath: racemes 3–4-fld., pubescent: fr. globose, dark red, on pedicels 6–20 mm. long; stone slightly ribbed. W. China. Intr. 1911. Zone V.—**P. discadènia** Koehne. Shrub or tree to 13 m.; brts. glabrous: lvs. obovate to oblong-obovate, 4–10 cm. long, acuminate, cordate or rounded at base, unequally serrate, the teeth with disciform glands, glabrous: racemes 3–9-fld., glabrous; pedicels 8–23 mm. long; sepals glandular-fimbriate, as long as tube: fr. subglobose, red; stone nearly smooth. C. China. Intr. 1907.

Subgen. IV. PADUS Koehne. Lvs. usually deciduous, serrate or serrulate: fls. rather small, in many-fld. racemes leafy at base, rarely leafless; calyx-tube short-campanulate; style not furrowed, stigma entire. (*Padus* Moench.)

65. **P. serótina** Ehrh. BLACK CHERRY. (Rum C.) Tree to 30 m., with dark brown bark, the inner aromatic; young brts. glabrous: lvs. oblong-ovate to lance-oblong, 5–12 cm. long, acuminate, cuneate, serrulate with small incurved callous teeth, lustrous above, light green beneath and often villous along the midrib, thickish and firm at maturity; petioles 6–25 mm. long, glandular: fls. white, 8–10 mm. across, in cylindric glabrous racemes 10–14 cm. long; pedicels 3–8 mm. long: fr. globose, 8–10 mm. across, finally black. Fls.v–vi; fr.ix–x. M.D.1906:1,t(c). S.S.4:t.159. F.E.32:533(h). (*Cerasus s.* Loisel., *Padus s.* Agardh.) Ont. to N. Dak., Tex. and Fla. Intr. 1629. Zone V.—Var. **péndula** Dipp. Brs. pendulous.—Var. **pyramidàlis** Zabel. Of narrow pyramidal habit.—Var. **aspleniifólia** Jaeg. With deeply and irregularly cut

lvs. (*Padus s.* f. *a.* Schneid.)—Var. **cartilaginea** Jaeg. With long shining lvs.—Var. **phelloïdes** Schwerin. Lvs. lanceolate. (Var. *salicifolia* Henry, not Koehne.)—Var. **neomontàna** Sudw. Lvs. broader, elliptic, glaucescent beneath: racemes rather few-fld. with pubescent calyx. Va. to Ala. Intr.?—Var. **salicifòlia** Koehne. Lvs. lanceolate, long-acuminate, not pubescent along the midrib beneath, subcoriaceous; racemes stouter, to 18 cm. long: fr. 1.5–2.5 cm. across, usually depressed-globose, edible. Jour. Hered. 13:51–61. L.I.t.34. (*P. capuli* Cav., *P. capollin* Koehne, *P. salicifolia* Kunth.) Mex. to Peru. Intr. 1820. Zone VIII?—Often planted for its handsome foliage; also valuable timber tree.

A closely related species is **P. vírens** Shreve. Smaller tree or shrub: lvs. smaller, usually elliptic, acute, rarely acuminate, more finely serrate; petioles eglandular: fls. smaller, in shorter racemes. (*Padus v.* Woot. & Standl.) N. Mex., Ariz. Intr. 1916. Zone (V).

66. **P. alabamènsis** Mohr. Tree to 10 m.; young brts. tomentose: lvs. ovate or elliptic to oblong-ovate, 6–12 cm. long, short-acuminate, sometimes obtusish, rounded or slightly narrowed at base, serrate with appressed callous teeth, whitish and finely pubescent beneath; petioles 6–12 mm. long, tomentose: fls. about 8 mm. across, in pubescent racemes 8–15 cm. long: fr. subglobose, about 8 mm. across, finally nearly black. S.M.526. (*Padus a.* Small.) Ala. Intr. 1906. Zone V.

Closely related species are: **P. Cuthbertii** Small. Tree to 6 m.: lvs. elliptic to obovate, 4–9 cm. long, glaucescent beneath, tomentose on midrib and pubescent on veins: racemes 5–8 cm. long, pubescent. Ga. Intr. 1912. Zone (V), VI.—**P. austrâlis** Beadle. Tree to 20 m.: lvs. elliptic to obovate, 4–10 cm. long, finely serrate, with rufous or tawny pubescence beneath, not glaucous: racemes pubescent, 7–10 cm. long. S.M.527. Ala. Intr. 1907. Zone VI?

67. **P. serícea** Koehne. Tree to 20 m.; young brts. glabrous: lvs. elliptic to oblong-obovate, 8–12 cm. long, acuminate, rounded or cuneate at base, serrulate, silky-pubescent beneath: fls. about 8 mm. across, in pubescent racemes 10–14 cm. long; calyx glabrous; stamens longer than petals: fr. globose-ovoid, 1.5 cm. long, black. (*P. napaulensis* var. *s.* Batal.) C. and W. China. Intr. 1901 or 1908. Zone VI?

Related species are: **P. Wilsònii** Koehne. Tree to 10 m.: lvs. beneath with white silky glossy tomentum: racemes pubescent; stamens at least 1½ times as long as petals. (*Padus W.* Schneid.) C. China. Intr. 1907. Only var. **leiòbotrys** Koehne with glabrous infl. in cult.—**P. rufómicans** Koehne. Tree to 30 m.: lvs. sharply serrulate, glabrous above, densely covered beneath with rufo-ferruginous tomentum: fruiting racemes glabrous: fr. subglobose, about 1 cm. across. W. China. Intr. 1908.

68. **P. Pàdus** L. European Bird Cherry. Tree to 15 m.; young brts. finely pubescent or glabrous: lvs. elliptic to obovate or oblong-ovate, 6–12 cm. long, abruptly acuminate, rounded or subcordate at base, sharply serrate, dull green above, grayish beneath, glabrous or with axillary tufts; petioles 1–1.5 cm. long, glabrous, glandular: fls. white, 1–1.5 cm. across, fragrant, in drooping loose racemes with the peduncle 10–15 cm. long, glabrous; calyx-tube pubescent inside: fr. globose, 6–8 mm. across, black; stone rugose. H.W. 3:t.56(c). R.I.25:t.95(c). S.E.3:t.413(c). Gn.53:92. (*P. racemosa* Lam. *Padus r.* Schneid., *Cerasus P.* DC.) Eu., N. Asia to Korea and Japan. Long cult. Zone III?—Var. **aucubaefòlia** Jaeg. Lvs. spotted yellow.—Var. **plèna** Bailey. Fls. semidouble. (*P. P. flore pleno* Bean.)—Var. **parviflòra** Beck. Fls. smaller, about 1 cm. across in rather dense upright racemes; pedicels 2–5 mm. long. (*Cerasus P.* var. *p.* Ser.)—Var. **Waterèri** Bean. Lvs. with conspicuous axillary tufts of hairs beneath: racemes to 20 cm. long.—Var. **Spaèthii**. Lvs. like those of the preceding var.: fls. about 2 cm. across;

petals obovate.—Var. **rubra** Reichenb. Fr. red. (*P. r.* Willd., not Ait.)—Var. **leucocárpa** Reichenb. Fr. yellowish white.—Var. **chlorocárpa** Reichenb. Fr. yellowish green. (*P. Salzeri* Zdarek.)—Var. **péndula** Dipp. Brs. pendulous.—Var. **commutàta** Dipp. Lvs. with coarser, more remote serration, nearly green beneath, unfolding much earlier than the type. (*P. Regeliana* Zabel, *P. Grayana* hort., not Maxim.) E. Asia. Cult. 1890.—Var. **laxa** Rehd. With slender pendulous brts.: lvs. usually oblong-obovate, acuminate, quite glabrous beneath and light green: racemes lax, pendulous: fr. small, with smooth or nearly smooth stone. Korea. Intr. 1906.—Var. **pubéscens** Regel. Young brts. and lvs. beneath more or less pubescent. N. E. Asia. Intr. 1906.

P. P. × *virginiana* = *P. Laucheana;* see under No. 71.

69. **P. pubígera** Koehne. Tree to 20 m.: lvs. oblong-obovate or obovate, 4–11 cm. long, slightly short-acuminate to acutish, cordate or subcordate at base, minutely serrulate, whitish beneath and glabrous, reticulate: petiole 1–2.5 cm. long, usually puberulous: fls. about 1 cm. across, in puberulous or glabrous racemes, without the stalk 7–14 cm. long; calyx-tube pubescent inside below the middle; stamens about ⅓ shorter than petals: fr. 8 mm. across; stone slightly rugose. (*P. brachypoda* var. *p.* Schneid., *P. p.* var. *Potaninii* Koehne.) W. China.—Only the following vars. are in cult.: var. **Práttii** Koehne. Lvs. of shoots oblong-obovate, broad-cuneate or rounded at base. Intr. 1907 or 1908.—Var. **obovàta** Koehne. Lvs. of shoots obovate, scarcely subcordate; petioles glabrous. Intr. 1907 or 1908.

70. **P. cornùta** Steud. Himalayan Bird-Cherry. Tree to 20 m.; young brts. finely pubescent or glabrous: lvs. oblong-ovate to elliptic or obovate, 8–20 cm. long, acuminate, subcordate to broad-cuneate at base, serrulate, dark green above, paler beneath and pubescent on the nerves when young; petioles 1.5–3 cm. long, usually glandular: fls. 6–8 mm. across, white, in dense glabrous or puberulous racemes 8–16 cm. long; sepals glandular-denticulate: fr. subglobose, about 8 mm. across, red finally dark brownish purple. R.H.1869:275. Gn.6:181. S.H.1:f.351w-w^2,352n. (*P. pachyclada* Zabel, *Cerasus c.* Wall., *Padus c.* Carr.) Himal. Cult. 1860. Zone VI or VII.

A closely related species is **P. napaulénsis** Steud. Lvs. more remotely serrate, cuneate at base; petioles glandless, pubescent: infl. very dense, pubescent: fr. 1.5 cm. across. S.H.1:f.351o^1-o^2,352k. Himal. Intr. 1881. Zone VII?

71. **P. virginiàna** L. Choke Cherry. Shrub or tree to 10 m.; brts. glabrous: lvs. broad-elliptic to obovate, 4–12 cm. long, abruptly acuminate, broad-cuneate to rounded at base, closely serrulate, dark green and somewhat lustrous above, glaucescent or grayish green beneath, glabrous except axillary tufts of hairs; petioles 1–2 cm. long, glandular: fls. 8–10 mm. across, white, in dense glabrous racemes, 7–15 cm. long: fr. globose, about 8 mm. across, dark purple; stone smooth. S.S.4:t.158. (*P. nana* Dur., *Padus v.* Roem.) Nfdl. to Sask., N. Dak. and Neb., south to N. C., Mo. and Kans. Intr. 1724. Zone I.—Var. **leucocárpa** S. Wats. Fr. amber-colored. Intr. 1889.—Var. **Duerínckii** Zabel. Lvs. broad-elliptic (var. *rotundifolia* Hort., in part).—Var. **nana** Bean. Dwarf form.—Var. **melanocárpa** Sarg. Lvs. usually smaller and thicker; fr. darker, usually nearly black; petioles glandless. (*P. m.* Rydb., *P. demissa* var. *m.* Nels.) N. Dak. to B. C., s. to N. Mex., Ariz. and s. Calif. Intr. 1879. Zone I.—Var. **xanthocárpa** Sarg. A yellow-fruited form of var. *melanocarpa.* Intr. 1912.—Var. **demíssa** Torr. Lvs. usually rounded or subcordate at base, pubescent beneath; petioles glandular: brts. and infl. glabrous or pubescent. S.M.524. (*P. d.* D. Dietr., *Cerasus d.* Nutt.) Wash. to Calif. Intr. 1892.—Var. **pachyrhàchis** Sarg. Lvs. broad-

cuneate or rounded at base; brts. and the stout rachis pubescent. (*Padus valida* Woot. & Standl. *Padus calophylla* Woot. & Standl.) N. Mex. Intr. 1916. Zone (V).

P. v. × *Padus* ? = **P. Laucheàna** Bolle. Lvs. broad-obovate, large, glaucescent beneath and with axillary tufts of hairs: fls. 1.5 cm. across: stone slightly rugose. (*P. padus* var. *rotundifolia* hort., *P. virginiana* var. *r.* Hort.) Cult. 1880.

Related species are: **P. bícolor** Koehne. Young brts. densely velutinous: lvs. obovate-oblong, short-acuminate, minutely serrate, glabrous and whitish beneath; racemes velutinous: fr. 5–6 mm. across; stone slightly rugose. W. China. Intr. 1908. Zone (V).—**P. velutìna** Batal. Brts. glabrous: lvs. elliptic, acuminate, serrulate, pale and thinly pilose beneath; racemes glabrous or pubescent; petals ⅓ shorter than stamens: stone smooth. S.H.1:f.352p(l). C. China. Intr. 1907.

72. **P. ssiòri** F. Schmidt. Tree to 25 m., with pale bark; brts. glabrous: lvs. oblong to oblong-obovate, 8–14 cm. long, long-acuminate, usually cordate, sharply serrate with aristate teeth, glabrous beneath except axillary tufts of hairs; petioles 2–4 cm. long, glandular: fls. small, white in glabrous racemes without peduncle 10–16 cm. long; calyx deciduous; petals as long as stamens: fr. about 1 cm. across, black; stone slightly ribbed. S.I.2:t.28,f. 1–13(c). S.H.1:f.351i-l,352g. (*Padus s.* Schneid.) N. E. Asia, Japan. Intr. 1915. Zone V.

73. **P. Grayàna** Maxim. Small tree to 10 m.; young brts. glabrous or pubescent: lvs. oblong-ovate, 7–14 cm. long, long-acuminate, usually rounded at base, sharply serrate with aristate teeth, grayish green beneath and slightly pubescent especially on the midrib; petioles short, eglandular: fls. white, about 1 cm. across, in glabrous racemes without peduncle 7–9 cm. long; calyx persistent; petals about as long as stamens and style: fr. 8 mm. across, apiculate, black; stone ovoid, pointed, smooth. S.H.1:f.351m-n²,352b. (*P. Padus* var. *japonica* Miq., *Padus G.* Schneid.) Japan. Cult. 1900. Zone V.

74. **P. Maàckii** Rupr. Tree to 15 m., with brownish yellow flaky bark; young brts. pubescent: lvs. elliptic to oblong-ovate, 6–10 cm. long, acuminate, rounded at base, finely serrulate, gland-dotted beneath and slightly hairy on the veins; petioles 1–2 cm. long, usually glandular: fls. white, about 1 cm. across, in dense pubescent racemes 5–7 cm. long, leafless at base; calyx-tube tubular-campanulate, longer than the glandular-denticulate sepals; petals oblong-obovate; style about as long as stamens, shorter than petals: fr. about 5 mm. across, black; stone rugulose. S.I.2:t.30(c). N.K.5:t.2. S.H.1:f.352h-i(l). (*Laurocerasus M.* Schneid.) Manch., Korea, C. China. Cult. 1903. Zone V or IV.—Conspicuous on account of the bright color of the flaky bark.

A supposed natural hybrid with *P. Maximowiczii* is **P. Meỳeri** Rehd. chiefly differing from *P. Maackii* in the darker not flaky bark, the longer and bracted peduncles and shorter style; from *P. Maximowiczii* in the lustrous orange-brown bark of the brs., in the gland-dotted lvs. and in the many-fld. racemes with smaller bracts. Korea. Intr. 1906. Zone V.

75. **P. Buergeriàna** Miq. Tree to 10 m.; young brts. pubescent or glabrescent: lvs. elliptic to oblong-elliptic, acuminate, 7–11 cm. long, cuneate, appressed-serrulate, light green beneath and glabrous except axillary tufts of hairs; petioles 8–12 mm. long: fls. about 7 mm. across, in slender puberulous racemes 6–8 cm. long; calyx-tube cup-shaped; sepals short, denticulate; stamens slightly longer than petals; style short: fr. subglobose, black, with persistent calyx. N.K.5:t.1. S.H.1:f.354a-g,355d. (*Laurocerasus B.* Schneid.) Japan, Korea. Intr. 1894 and 1915. Zone V.

Related species are: **P. venòsa** Koehne. Lvs. sharply serrate, reticulate beneath and glabrous except axillary tufts of hairs: infl. velutinous. C. China. Intr. 1907. **P. stellípila** Koehne. Lvs. sharply serrate, reticulate and pubescent beneath: infl. glabrous or puberulous. C. China. Intr. 1907.—**P. perulàta** Koehne. Lvs. serru-

late with rather short teeth, slightly hairy beneath, more densely along midrib: infl. with persistent involucre at base: rachis velutinous. W. China. Intr. 1908.

Subgen. V. LAUROCERASUS Koehne. Lvs. evergreen, serrate, dentate or entire: racemes leafless at base, otherwise like the preceding subgen. (*Laurocerasus* Roem.)

76. **P. lusitànica** L. PORTUGAL LAUREL. Evergreen shrub or small tree to 20 m.: brts. glabrous: lvs. oblong-ovate, 6–12 cm. long, acuminate, rounded at base, shallowly serrate, glabrous, dark lustrous green above, paler beneath; petioles 1.5–2.5 cm. long: fls. white, 8–12 mm. across, in slender glabrous racemes 15–25 cm. long; calyx-tube cup-shaped, with short denticulate lobes: fr. conic-ovoid, about 8 mm. long, dark purple. M*G.27:568(h),569. M.D. 1914:278(h). S.L.317. (*Laurocerasus l.* Roem., *Padus L.* Mill.) Spain, Port. Intr. 1648. Zone VI–VII.—Var. **variegàta** Nichols. Lvs. margined with white.—Var. **angustifòlia** Dipp. Lvs. oblong-lanceolate, 5–8 cm. long. M.D.1907:1,t(c).—Var. **myrtifòlia** Mouillef. Compact pyramidal shrub: lvs. usually 3–5 cm. long. Bull. Soc. Ort. Tosc. 22:t.2(h).—Planted for its evergreen bright green and lustrous lvs.

77. **P. Laurocérasus** L. CHERRY LAUREL. Shrub or small tree to 6 m.; young brts. glabrous or puberulous: lvs. usually oblong or obovate-oblong, 5–15 cm. long, acuminate, cuneate to rounded at base, obscurely serrate to nearly entire, glabrous, lustrous dark green above; petioles 5–10 mm. long: fls. about 8 mm. across, in glabrous racemes 5–12 cm. long: fr. conic-ovoid, about 8 mm. long, black-purple. H.A.4:41(c). Gn.50:313. S.L.316(h). M. D.1911:253(h). (*Padus L.* Mill., *Laurocerasus officinalis* Roem.) S. E. Eu., Asia Minor. Intr. 1576. Zone VI–VII.—Var. **angustifòlia** Jaeg. Lvs. narrow-oblong to lanceolate, 6–12 cm. long.—Var. **caucásica** Jaeg. Of upright slender habit: lvs. to 18 cm. long and 7–8 cm. wide. G.C.III.5:621.—Var. **cólchica** Jaeg. Of spreading habit, with short brs.: lvs. thinner, to 18 cm. long and about 5 cm. wide. G.C.III.5:621.—Var. **magnoliaefòlia** Bean. Lvs. to 25 cm. long and 7–10 cm. wide. G.C.III.78:249(h).—Var. **parvifòlia** Nichols. Lvs. 3–4 cm. long and 1 cm. wide. G.C.III.561 (as var. *angustifolia*).—Var. **schipkaénsis** Spaeth. Shrubby: lvs. 5–12 cm. long and 2–3.5 cm. wide, nearly entire: racemes 6–8 cm. long. R.H.1905:409(h). M.G.17: 281(h).—Var. **sérbica** Pancic. Similar to the last, but of more upright habit and with obovate rugose lvs.—Var. **Zabeliana** Spaeth. Similar to the preceding, but lvs. narrower. G.W.5:177(h). G.C.III.78:251(h). Cult. 1898. This and the 2 preceding vars. are the hardiest forms and are hardy in Zone V.—Handsome evergreen shrub with large lvs.

47. **OSMARÒNIA** Greene. Deciduous shrub; winter-buds stalked, with few imbricate scales: lvs. alternate, short-petioled, entire, with deciduous small stipules: fls. polygamo-dioecious, greenish white, in short racemes; pedicels with 2 bractlets; calyx-tube campanulate, with short triangular lobes; petals spatulate-oblong; stamens 15, 10 inserted with the petals, 5 below; carpels 5, style not exceeding the calyx-tube: fr. consisting of 1–5 oblong drupes with thin flesh and smooth stone. (Derivation of name doubtful.) Syn.: *Nuttallia* Torr. & Gr., not Barton. One or possibly more species in W. N. Am.

O. cerasifórmis Greene. Shrub to 5 m. with usually numerous upright stems: brts. glabrous, green: lvs. oblong-lanceolate, 7–10 cm. long, acute at ends, grayish green and pubescent beneath; petioles 5–10 mm. long: fls. fragrant, 8–10 mm. across, in short peduncled 5–10-fld. glabrous racemes, with the lvs.: fr. 1–1.5 cm. long, bluish black, bloomy. Fls.IV–V; fr.VII–VIII.

L.I.t.9. G.C.III.19:489;43:266, 267;77:147. Gn.34:78. B.S.2:102(fr). (*N. c.* Torr. & Gr.) B. C. to Calif. Intr. 1848. Zone (V), VI.—Rarely cult.; chiefly valued for its early fragrant fls. and the bright green foliage; the staminate plant is more floriferous, but lacks the attractive fr. of the pistillate plant.

48. **PRINSÉPIA** Royle. Deciduous shrubs with axillary spines; brs. with lamellate pith; winter-buds small, with few pubescent scales, enclosed by the stipules: lvs. alternate, mostly fascicled, petioled, entire or serrulate; stipules small, lanceolate, persistent: fls. 1–4, in the axils of last year's brts. or in axillary racemes; calyx-tube cup-shaped, with broad and short lobes imbricate in bud; petals 5, spreading, suborbicular, clawed; stamens 10 or many, with short filaments; ovary 1-celled, style inserted near base; stigma capitate; ovules 2: fr. a drupe with slightly sculptured stone. (Named for Macaire-Prinsep, botanist at Geneva, Switzerland.) Syn.: *Plagiospermum* Oliv. Three or four species in E. Asia to N. W. China and Himal.—Fr. edible and gathered in their native countries, sparingly produced in cult.

Fls. yellow: lvs. ovate-lanceolate to lanceolate.....1. *P. sinensis*
Fls. white: lvs. linear-oblong to narrow-oblong.....2. *P. uniflora*

1. **P. sinénsis** Oliver. Shrub to 2 m. or taller; brs. light gray-brown; spines 6–10 mm. long: lvs. slender-petioled, ovate-lanceolate to lanceolate, 5–8 cm. long, long-acuminate, entire, or sparingly serrulate, finely ciliate, otherwise glabrous, bright green: fls. fascicled, 1–4, about 1.5 cm. across; pedicels about 1 cm. long; stamens 10: fr. subglobose or ovoid, 1.5 cm. long, purple, juicy; stone ovoid, compressed. Fls.III–IV; fr.VIII. M.D.1903:1,t(c). I.T.5:t.182. H.I.16:1526. R.H.1907:418, 419. B.S.2:224. S.L.303(h). (*Plagiospermum sinense* Batal.) Manch. Cult. 1896. Zone IV?—Valued for its early appearing bright green lvs.; fls. not very conspicuous.

2. **P. uniflòra** Batal. Shrub to 1.5 m.; brs. light gray; spines 6–10 mm. long: lvs. short-petioled, linear-oblong to narrow-oblong, 2.5–6 cm. long, acutish or obtuse, entire or remotely serrulate, dark green above, paler beneath, glabrous: fls. fascicled, 1–3, about 1.5 cm. across; pedicels 3–5 mm. long; stamens 10: fr. globose, 1–1.5 cm. across, black, bloomy; stone ovoid, compressed. Fl.IV–V; fr.VIII. U. S. Inv. 41:t.4. N. W. China. Intr. 1911. Zone V.

The Himalayan **P. ùtilis** Royle differs chiefly in its longer spines, elliptic to oblong-lanceolate lvs. and racemose white fls. with many stamens. Royle, Ill. Bot. Himal.t.38,f.1. Cult. 1919. Zone VII or VIII?

Fam. 41. LEGUMINOSAE B. Juss. PEA FAMILY

Herbs, shrubs or trees, often twining or climbing, deciduous or evergreen: lvs. alternate, compound, rarely simple, stipulate: fls. regular or irregular, usually bisexual; sepals 5, more or less connate, usually unequal; petals 5, rarely fewer, usually papilionaceous, or nearly equal or unequal; stamens 10 or numerous, rarely 5; all united or 9 united and 1 free or all free; carpels 1, rarely 2–15, superior; ovary 1-celled, unequilateral; ovules 1 to many, affixed to a single parietal placenta: fr. a legume, sometimes indehiscent or follicular or fleshy, often jointed between the seeds and sometimes filled with pulp; seed exalbuminous.—About 430 genera and 7000 species, distributed over both hemispheres, most abundant in the tropics.

Fls. not papilionaceous: lvs. pinnate or bipinnate.
A. Stamens numerous, much longer than corolla; petals valvate; fls. in long-peduncled heads: lvs. bipinnate.....1. *Albizzia*

AA. Stamens 6–10, shorter than corolla; petals imbricate.
BB. Fls. grænish or whitish: trees.
CC. Fls. in lateral spike-like racemes; calyx-tube short: lvs. pinnate or bipinnate; lfts. crenulate, 2–6 cm. long....3. *Gleditsia*
CC. Fls. in terminal loose panicles; calyx-tube tubular: lvs. bipinnate; lfts. entire, 6–8 cm. long....4. *Gymnocladus*
BB. Fls. bright yellow: lvs. bipinnate; climbing shrub, prickly....5. *Caesalpinia*
Fls. papilionaceous.
A. Lvs. simple (occasionally 3 on young brts. in No. 11).
B. Lvs. reniform, large: fls. pink, rarely white, before the lvs.: tree....2. *Cercis*
BB. Lvs. narrow, small, sometimes wanting: fls. usually yellow: shrubs.
C. Calyx 1-lipped, deeply split above: fls. yellow: lvs. usually wanting....12. *Spartium*
CC. Calyx 2-lipped: fls. yellow or white.
D. Calyx divided to the middle.
E. Seed without callous appendage at base: brs. often spiny....13. *Genista*
EE. Seed with callous appendage: spineless shrubs....18. *Cytisus*
DD. Calyx divided to the base: very spiny leafless shrubs....19. *Ulex*
CCC. Calyx with teeth of nearly equal length: infl. few-fld.: spiny shrubs.
D. Fld. terminal, blue: fr. glandular-pubescent: nearly leafless shrub....11. *Erinacea*
DD. Fls. axillary: fr. glabrous.
E. Fls. yellow: brts. and lvs. pubescent....22. *Anthyllis*
EE. Fls. red: brts. and lvs. glabrous or nearly so....35. *Alhagi*
AA. Lvs. ternate or digitate (see also AAA.)
B. Lvs. digitate.
C. Fls. yellow, in terminal racemes: lfts. 7–11....10. *Lupinus*
CC. Fls. white or pink, in lateral heads: lfts. 4–5....23. *Dorycnium*
BB. Lvs. ternate.
C. Fls. yellow.
D. Calyx toothed; unarmed trees or shrubs.
E. Stamens free: stipules connate: lfts. 5–10 cm. long, stout shrub. 9. *Piptanthus*
EE. Stamens connate to the middle or higher: stipules free or wanting.
F. Lvs. and brts. opposite: small shrubs....13. *Genista*
FF. Lvs. and brts. alternate.
G. Ovary and fr. densely glandular: lfts. small, 8–18 mm. long: much-branched shrub....17. *Adenocarpus*
GG. Ovary and fr. not glandular.
H. Calyx 2-lipped, with very unequal teeth.
I. Lfts. 2–8 cm. long: large shrubs or trees; pod tardily dehiscent.
J. Racemes short, upright; the 2 upper calyx-lobes distinct. 14. *Petteria*
JJ. Racemes usually pendulous; the two upper calyx-lobes partly connate....15. *Laburnum*
II. Lfts. less than 2.5 cm. long (see also *Laburnum caramanicum*): fls. in racemes, heads or axillary.
J. Seeds with appendage; petals all free....18. *Cytisus*
JJ. Seed without appendage; lower petals at base adnate to staminal tube....13. *Genista*
HH. Calyx with nearly equal teeth; pod spirally twisted or falcate; middle lft. distinctly stalked....21. *Medicago*
DD. Calyx truncate, without teeth: fls. fascicled or solitary: lfts. 1.5 cm. or less long. 16. *Calycotome*
CC. Fls. not yellow.
D. Upright shrubs.
E. Stipules subulate or wanting.
F. Pods several-seeded.
G. Lfts. serrulate: fls. pink: pod inflated....20. *Ononis*
GG. Lfts. entire: pod not inflated.
H. Pod dehiscent into 2 valves....18. *Cytisus*
HH. Pod articulate, breaking apart at maturity: lfts. with stipels. 36. *Desmodium*
FF. Pod 1-seeded: lfts. without stipels.
G. Pedicels usually 2 in the axils of persistent bracts, not articulate. 37. *Lespedeza*
GG. Pedicels usually solitary in the axils of deciduous bracts, articulate below the calyx....38. *Campylotropis*
EE. Stipules leafy: fls. in stalked heads, white or pink....23. *Dorycnium*
DD. Twining shrub: lfts. to 16 cm. long: fls. in dense racemes, violet....39. *Pueraria*
AAA. Lvs. pinnate.
B. Lvs. odd-pinnate.
C. Fls. not yellow.
D. Corolla incomplete, only standard present: fls. small, in dense upright panicled racemes....25. *Amorpha*
DD. Corolla complete.
E. Fls. in panicles, usually white or whitish.
F. Pod flat, not articulate: lfts. 5–12 cm. long.
G. Winter-buds free, scaly: lfts. opposite or nearly so: fls. in dense upright panicled racemes....6. *Maackia*

GG. Winter-buds enclosed in the petiole, minute.; lfts. alternate: fls. in upright or pendulous panicled racemes.....7. *Cladrastis*
FF. Pod terete, articulate: fls. in upright panicles: lfts. 1–3.5 cm. long..8. *Sophora*
EE. Fls. in simple racemes.
F. Racemes pendulous.
G. Racemes terminal or lateral on last year's brts.: climbing shrubs.
26. *Wistaria*
GG. Racemes axillary: upright trees or shrubs.....27. *Robinia*
FF. Racemes upright; upright shrubs.
G. Pods not articulate, linear, dehiscent: stipulates small, subulate.
24. *Indigofera*
GG. Pod articulate, separating into the joints: stipules conspicuous, scarious.
34. *Hedysarum*
CC. Fls. yellow.
D. Pod inflated: lfts. 7–13.....28. *Colutea*
DD. Pod not inflated.
E. Lfts. 11–27: decumbent, glandular-pubescent shrub.....31. *Calophaca*
EE. Lfts. 5–9: glandless shrubs.....33. *Coronilla*
BB. Lvs. abruptly pinnate; rachis often spinescent.
C. Pod 1-celled: stipules subulate.
D. Fls. lilac in 2–3-fld. racemes: pod stipitate, inflated, obovate to oblong.
29. *Halimodendron*
DD. Fls. yellow or whitish, solitary or fascicled: pod sessile, linear.....30. *Caragana*
CC. Pod 2-celled or incompletely 2-celled: low shrubs with spinescent rachis.31. *Astragalus*

Subfam. I. MIMOSOIDEAE Taub. Trees and shrubs, rarely herbs, with usually bipinnate lvs.: fls. actinomorphous; petals valvate; stamens 5 to many. (*Mimosaceae* Reichenb.)

1. **ALBÍZZIA** Durazz. Deciduous trees or shrubs: lvs. bipinnate; lfts. usually small and numerous: fls. in axillary peduncled spikes or globular heads; calyx tubular or campanulate, 5-toothed; corolla small, the segments connate more than ½; stamens numerous, more or less connate at base, exserted: pod large, strap-shaped, without pulp. (After Albizzi, an Italian naturalist.)—About 25 species in trop. and subtrop. Asia, Afr. and Austr.; one in Mex.

A. julibríssin Durazz. Tree to 12 m., with broad spreading head; brts. glabrous, angular: lvs. with 10–25 pinnae, each with 40–60 lfts.; lfts. falcate, oblong, very oblique, about 6 mm. long, ciliate and sometimes pubescent on midrib beneath: fls. light pink, in slender-peduncled heads crowded at the upper end of brts.: pod flat, to 15 cm. long. Fl.VI–VIII; fr.IX–XI. S.I.1:t.51(c). (*Acacia j.* Willd., *A. nemu* Willd.) Persia to C. China. Intr. 1745. Zone VIII.—Var. **rósea** Mouillef. Dwarfer and hardier than the type: fls. bright pink. R.H.1870:490,t(c);1912:184, 185. F.S.t.2199(c). Zone VII.

Subfam. II. CAESALPINIOIDEAE Taub. Trees or shrubs, rarely herbs: lvs. simple to bipinnate: fls. nearly regular or imperfectly papilionaceous; calyx with usually free segments; petals 5, rarely fewer, imbricate, the upper petal inside; stamens 10, rarely fewer; usually free. (*Cassiaceae* Link.)

2. **CERCIS** L. REDBUD. Deciduous shrubs or trees; brts. glabrous; winter-buds several, superposed, small, with several outer scales: lvs. simple, entire, palminerved, petioled, with small caducous stipules: fls. fascicled or racemose, before or with the leaves, papilionaceous; calyx broad-campanulate with short obtuse teeth; petals unequal, the 3 upper smaller; stamens 10, free: ovary stipitate: pod flat, narrow-oblong, thin, narrowly winged on the ventral suture; seeds several, flattened. (Ancient Greek name, *Kerkis.*)—Seven species in N. Am. and from S. Eu. to E. Asia.—Planted for their early showy fls.

A. Lvs. rounded or emarginate at apex: fls. fascicled.....1. *C. Siliquastrum*
AA. Lvs. abruptly short-acuminate.
B. Fls. fascicled
C. Lvs. cordate with broad open sinus, without transparent margin, dull beneath when young; fls. less than 1.5 cm. long.....2. *C. canadensis*

cc. Lvs. deeply cordate, with transparent cartilaginous margin, lustrous beneath when young: fls. more than 1.5 cm. long.....3. *C. chinensis*
bb. Fls. racemose: lvs. truncate or subcordate, pubescent beneath.....4. *C. racemosa*

1. **C. Siliquástrum** L. Tree to 10 m.: lvs. suborbicular, 7–12 cm. across, deeply cordate, glabrous: fls. 3–6, rose-purple, 1.8–2 cm. long: pod 7–10 cm. long. Fl.IV–V; fr.X. B.M.1138(c). Gn.44:379;52:5. G.C.III.52:6(h). S. Eu., W. Asia. Cult. since ancient times. Zone VI or VII.—Var. **alba** West. Fls. white. (Var. *albida* Schneid.) Cult. since the 16th century.

Related species are: **C. renifórmis** Engelm. Small tree to 12 m.: lvs. broad-ovate to reniform, 5–8 cm. across, often longer than broad, obtuse to emarginate, glabrous or pubescent below: fls. 1–1.5 cm. long, slender-stalked, occasionally racemose: pod 5–10 cm. long and to 1.5 cm. wide. S.S.3:t.135. (*C. texensis* Sarg.) Tex., N. Mex. Intr. 1901. Zone VII?—**C. occidentális** Torr. Shrub: lvs. reniform, 3.5–7 cm. across, broader than long, emarginate, glabrous: fls. 1–1.5 cm. long, usually short-stalked: pod 5–8 cm. long and to 2 cm. wide. U. S. Explor. Exp. 1838–42, 17:t.3. Cult. 1901.

2. **C. canadénsis** L. Tree to 12 m., with broad round head: lvs. broad-ovate to suborbicular, 7–12 cm. long, usually cordate at base, usually glabrous or nearly so beneath: fls. 4–8, rosy-pink, 1–1.2 cm. long; pedicels 5–12 mm. long: pod 6–8 cm. long. Fl.IV–V; fr.IX–X. G.O.t.92(c). S.S.3:t.133, 134. B.C.2:720. Gg.6:290(h). F.E.9:593(h). M.G.14:434–5(h). Intr. 1730. Zone V.—Var. **alba** Rehd. Fls. white. Mo. Bot. Gard. Bull. 10:110,t. Orig. before 1903.—Var. **plèna** Sudw. Fls. with some stamens transformed into petals. Orig. before 1894.—Var. **pubéscens** Pursh. Lvs. more or less pubescent beneath.

3. **C. chinénsis** Bge. Tree to 15 m.; in cult. usually shrubby: lvs. suborbicular, 7–12 cm. long, deeply cordate, glabrous, lustrous above, subcoriaceous at maturity: fls. 5–8, rosy-purple, 1.5–1.8 cm. long; pedicels 6–15 mm. long: pod 7–12 cm. long, narrow. Fl.V; fr.X. F.S.t.849(c). Mn.2:139. G.F. 6:476(h). B.C.2:721. (*C. japonica* Planch.) C. China. Intr. before 1850. Zone (V), VI.—Very handsome in bloom.

4. **C. racemòsa** Oliv. Tree to 10 m.: lvs. broad-ovate, 6–10 cm. long, subcordate or truncate, pubescent beneath: fls. rosy-pink, 1.2 cm. long, slender-stalked, in pendulous racemes 4–10 cm. long: pod 6–10 cm. long. Fl.V; fr.X. H.I.t.1894. C. China. Intr. 1907. Zone VI or VII.

3. **GLEDÍTSIA** L. Honey-Locust. Deciduous trees, usually armed with stout often branched spines; winter-buds usually minute, 3–4 superposed, the upper ones larger and scaly, the lower ones covered by the base of the petiole: lvs. alternate, often fascicled, abruptly pinnate or bipinnate usually on the same tree; lflts. irregularly and slightly crenate; stipules minute: fls. polygamous, in racemes or rarely in panicles; calyx-lobes and petals 3–5; petals nearly equal, not much longer than calyx-lobes; stamens 6–10; style short, with large terminal stigma: pod compressed, usually large, indehiscent, 1–many-seeded; seeds flattened, suborbicular. (After G. Gleditsch, director of Bot. Garden at Berlin; died 1780.) Syn.: *Gleditschia* Scop. About 12 species in N. Am., C. and E. Asia, trop. Afr. and S. Am.—Ornamental trees usually armed with branched spines; the spreading brs. forming a loose head; fls. in May and June; fr. in autumn and remaining on the tree a long time.

A. Pod many-seeded, 8–40 cm. long.
  B. Spines compressed, at least at base: walls of pod papery or leathery; pod flat, usually twisted, not dotted.
    C. Lflts. usually acute, to 3.5 cm. long, usually more than 20 in pinnate lvs.: ovary pubescent.....1. *G. triacanthos*
  CC. Lflts. obtuse or emarginate, 2–6 cm. long, usually less than 20: ovary glabrous or pubescent only on margin.

D. Lvs. with 16–20 lfts. 2–4.5 cm. long, often bipinnate: brts. glabrous. .2. *G. horrida*
DD. Lvs. with 8–16 lfts. 3–6 cm. long, rarely bipinnate: young brts. pubescent. 3. *G. Delavayi*
BB. Spines terete; pods straight or falcate, not twisted, convex, with thick woody walls dotted with minute pits: lvs. very rarely bipinnate.
C. Lfts. 6–12, ovate-oblong, 4–7.5 cm. long: pedicels about 1 cm. long.4. *G. macracantha*
CC. Lfts. 8–16, ovate-lanceolate, 2–6 cm. long: pedicels 2–4 mm. long.....5. *G. sinensis*
AA. Pod 1–3-seeded, 2.5–5 cm. long.
B. Lfts. entire, pubescent beneath: pod 2–3-seeded.....6. *G. heterophylla*
BB. Lfts. crenulate, glabrous beneath: pod 1–2-seeded.....7. *G. aquatica*

1. **G. triacánthos** L. HONEY-LOCUST (Sweet Locust, Three-thorned Acacia). Tree to 45 m., usually with stout simple or branched spines 6–10 cm. long on trunk and brs.: lvs. 14–20 cm. long; rachis pubescent all around, grooved; pinnate lvs. with 20–30 oblong-lanceolate lfts. 2–3.5 cm. long, remotely crenate-serrulate, pubescent on the midrib beneath; bipinnate lvs. with 8–14 pinnae, the lfts. 8–20 mm. long: fls. very short-stalked, in narrow racemes 5–7 cm. long: pod 30–45 cm. long, falcate and twisted at length. Fl. VI; fr. X–XII. S.S.3:t.125, 126. Gn.32:304. H.H.288, 289(b). F.L.6:201, t(h). Am. For. 23:91(h). Pa. to Neb., Tex. and Miss. Intr. about 1700. Zone V.—Var. **inérmis** Pursh. Unarmed or nearly so and of more slender habit.—Var. **elegantíssima** Rehd. Unarmed and of dense bushy habit: lfts. smaller. R.H.1905:513. Orig. about 1880.—Var. **Bujòti** Rehd. Brts. slender, pendulous: lfts. narrower. (*G. B.* Neum., *G. B. pendula* Hort.) Orig. before 1845.—Var. **nàna** Henry. Small compact shrub or tree, with rather short and broad dark green lfts. (*G. sinensis* var. *n.* Loud., *G. ferox* var. *n.* Rehd.) Cult. 1838.—Often planted as an ornamental tree; the large branched thorns make the tree conspicuous in winter.

G. t. × *aquatica* = **G. texàna** Sarg. Pod straight, 10–12 cm. long. S.S.13:t.627. Tex. Intr. 1900. Zone ?

2. **G. hórrida** Mak. Tree to 25 or 25 m.; thorns somewhat compressed, 5–10 cm. long, often branched; young brts. purplish: lvs. 25–30 cm. long; pinnate lvs. with 16–20 ovate to oblong or nearly lanceolate lfts. 2–4, rarely to 6 cm. long, entire or remotely crenulate, lustrous above, pubescent on midrib beneath or glabrous; bipinnate lvs. with 8–12 pinnae, lfts. 1–2.5 cm. long; rachis pubescent on edge of groove: fls. short-stalked, in slender racemes: pod 25–30 cm. long, twisted and bullate; seeds near the middle. Fl. VI–VII; fr. X–XI. S.I.1:t.51(c). G.F.6:165. B.C.3:1347. (*G. japonica* Miq.) Japan, China. Intr. about 1800? Zone V or VI.

To *G. horrida* may belong the incompletely known **G. férox** Desf. A tree with very stout compressed spines: lvs. often bipinnate; lfts. 16–30, oblong-ovate to ovate-lanceolate, 1.5–3.5 cm. long, crenate. ?China. Intr. about 1800.—A closely related species is **G. cáspica** Desf. Tree to 12 m.; very spiny; young brts. green: lvs. pinnate with 12–20 ovate to elliptic crenulate lfts. 2–5 cm. long, or bipinnate with 6–8 pinnae; rachis and petiolules pubescent; pod curved, about 20 cm. long, thin. (*G. horrida* var. *c.* Schneid.) S.H.2:f.6l-o,7d. S.L.214(h). Transcauc., N. Persia. Intr. 1822. Zone VI?

3. **G. Delavayi** Franch. Tree to 10 m.; young brts. puberulous; spines compressed at base, to 25 cm. long: lvs. pinnate with 8–16 obliquely ovate to ovate-oblong emarginate or obtuse lfts. 3–6 cm. long, the lower ones much smaller than the upper ones, slightly crenate or nearly entire, dark green and lustrous above, the midrib slightly impressed above and pubescent, usually slightly pubescent beneath and scarcely reticulate; on young plants much smaller and often bipinnate: fls. in slender puberulous racemes; ovary glabrous: pod 15–35 or sometimes to 50 cm. long, twisted, with leathery walls. S.H.2:f.6g-h,7b. S. W. China. Intr. 1900. Zone VIII.

4. **G. macracántha** Desf. Tree to 15 m., with large spines; brts. glabrous: lvs. simply pinnate; lfts. 6–12, ovate-oblong, rarely obovate, 5–7.5 cm. long,

the lower ones smaller and ovate-lanceolate, crenulate, glabrous, except pubescent on the midrib above and less densely so beneath, strongly reticulate; rachis pubescent on edge of groove: fls. in pubescent simple racemes; pedicels slender, about 1 cm. long; ovary pubescent on the margin: pod 15–30 cm. long, 2.5–3.5 cm. broad, slightly convex. C.C.183. C. China. Cult. 1800. Zone VI.

5. **G. sinénsis** Lam. Tree to 15 m., with stout conical often branched spines; brts. glabrous: lvs. pinnate, 12–18 cm. long; lfts. 8–14, rarely to 18, ovate to oblong-ovate, 3–8 cm. long, obtuse or acutish, mucronulate, crenulate, dull yellowish green above, reticulate beneath and slightly pubescent on midrib, more densely above; rachis pubescent on edge of groove and petiolules pubescent: fls. in slender puberulous racemes; pedicels 3–5 mm. long; ovary glabrous, pubescent on the margin: pod nearly straight, 12–25 cm. long and 2–3 cm. broad, convex. S.H.2:f.6b-c,7c-c^1. U. S. Im. 40,t.4(h). (*G. horrida* Willd.) E. China. Intr. 1774. Zone VI.

6. **G. heterophýlla** Bge. Shrub or small tree; spines slender, simple or trifid, to 3.5 cm. long: young brts. pubescent: lvs. pinnate, with 10–18 oblique-oblong, rarely obovate-oblong lfts. 1–3 cm. long, obtuse, entire, pubescent beneath and grayish green, or bipinnate with 3–4 pairs of pinnae each with 12–20 lfts.; rachis puberulous: fls. subsessile in pubescent spikes sometimes panicled, the fls. in dense clusters: pod long-stipitate, obliquely elliptic to elliptic-oblong, thin, glabrous; seeds orbicular-oval, 8–9 mm. long, brown. S.H.2:f.7g(l). N. E. China. Intr. 1907. Zone V.

7. **G. aquática** Marsh. Water Locust. (Swamp L.) Tree to 20 m., with stout trunk; spiny: pinnate lvs. with 12–18 ovate-oblong lfts. 2–3 cm. long, usually rounded or emarginate, slightly crenulate and often entire below the middle, glabrous except few hairs on the petiolules; bipinnate lvs. with 6–8 pinnae; petioles pubescent on the edges of the groove: fls. in racemes 7–10 cm. long; pedicels short; ovary glabrous; pod 2.5–5 cm. long, long-stipitate, thin. S.S.3:t.127, 128. H.H.290, 291(b). (*G. inermis* Mill., not L., *G. monosperma* Walt.) S. C. and Ky. to Fla. and Tex. Intr. 1723. Zone V or VI.

G. a. × *triacanthos* = *G. texana;* see under No. 1.

The Chinese *G. australis* and *G. officinalis* Hemsl. and *G. fera* Merr. are not in cult. and probably not hardy.

4. **GYMNÓCLADUS** L. Deciduous trees, unarmed, with stout brs.; winter-buds small, several superposed, indistinctly scaly; terminal bud wanting: lvs. bipinnate; lfts. entire; stipules small, deciduous: fls. in terminal panicles, dioecious or polygamous, regular; calyx tubular, 5-lobed; petals 5, oblong, slightly longer than sepals; stamens 10; ovary with 4–8 ovules; style short: pod broad-oblong, thick, flat, pulpy; seeds large, flattened. (Greek *klados*, branch, and *gymnos*, naked, referring to the stout brs. destitute of twigs.) Two species in N. Am. and China.

G. dioèca K. Koch. Kentucky Coffee-tree. Tree to 30 m.; brts. pubescent at first: lvs. 15–35 cm. long, with 3–7 pairs of pinnae, the lowest usually reduced to simple lfts, the upper with 6–14 lfts.; lfts. ovate or elliptic-ovate, 5–8 cm. long, acute, rounded or cuneate at base, pubescent beneath when young, short-stalked; petioles 4–6 cm. long: pistillate infl. to 25 cm. long, staminate much smaller and denser: fls. about 1.2 cm. long, long-stalked, greenish white, pubescent: pod oblong, 15–25 cm. long, thick, brown; seeds suborbicular, 2–2.5 cm. long. Fl.vi; fr.x(–iv). S.S.3:t.123, 124. H.H. 286, 287(b). B.C.3:1420. R.H.1897:491. Gn.M.34:138(h). (*G. canadensis*

Lam.) N. Y. and Pa. to Minn., Neb., Okl. and Tenn. Intr. before 1750. Zone V.—Ornamental tree with large foliage pink when unfolding turning clear yellow in autumn; the conspicuous pods persisting during the winter.

The Chinese **G. chinénsis** Baill. has oblong obtuse smaller lfts. pubescent on both sides: fr. 7–10 cm. long; thicker: fls. lilac-purple, before the lvs. C.C.181. S.H.2:f.9i-n. Intr. 1907. Zone ?

5. **CAESALPÌNIA** L. Trees or shrubs, sometimes climbing, armed or unarmed: lvs. bipinnate, stipulate: fls. in racemes often forming terminal panicles; calyx with short tube and 5 imbricate lobes, the lowest one larger; petals 5, clawed, nearly equal; stamens 10, curved: ovary sessile with few ovules and a slender style: pod ovate to lanceolate, usually compressed, often indehiscent. (After Andreas Caesalpini, Italian botanist; 1519–1603.) About 40 species in trop. and subtrop. regions.

C. japónica Sieb. & Zucc. Deciduous spreading shrub with long and slender brs. armed with stout recurved prickles: lvs. with 6–16 pinnae, each with 10–20 lfts. oblong, 1.5–2 cm. long, obtuse, pubescent below; rachis prickly: fls. canary-yellow, slender-stalked, in panicles to 30 cm. long; stamens red. Fl.VI; fr.IX. B.M.8207(c). G.C.III.42:43. R.H.1912:60,t.(c). Gn.40: 588,t.(c);76:411. Japan. Cult. 1887. Zone VIII?

Subfam. III. PAPILIONATAE Taub. Fls. papilionaceous; the upper petal (standard) enclosing the others in bud; rarely only the standard present. (*Papilionaceae* L., *Fabaceae* Reichenb.)

Tribe 1. SOPHOREAE Taub. Lvs. pinnate; stipules sometimes wanting; stamens free or slightly connate; petals of keel free, rarely connate.

6. **MAÀCKIA** Rupr. & Maxim. Deciduous tree; winter-buds with several imbricate scales: lvs. odd-pinnate; lfts. opposite or nearly so, entire, short-stalked; fls. white, in dense upright racemes, usually several forming terminal panicles; calyx campanulate, 5-toothed; stamens 10, connate at base; pod linear-oblong, dehiscent, compressed, 1–5-seeded. (For Richard Maack, Russian naturalist; 1825–86.) Six species in E. Asia.

M. amurénsis Rupr. Tree to 15 ft.: lfts. 7–11, elliptic to oblong-ovate, 5–8 cm. long, short-acuminate, rounded at base, glabrous: fls. about 8 mm. long, in usually panicled racemes 10–20 cm. long: pod 3.5–5 cm. long. Fl. VII–VIII; fr.IX–X. B.M.6551(c). Gn.33:444. B.S.2:64. (*Cladrastis a.* K. Koch.) Manch. Intr. 1864. Zone V or IV.—Var. **Buèrgeri** Schneid. Lfts. pubescent beneath, obtusish. S.I.1:t.50(c). (*Cladrastis a.* var. *floribunda* Shiras.) Japan. Intr. 1892.

Closely related species are: **M. chinénsis** Takeda. Tree to 23 m.; lfts. 11–13, ovate to elliptic, 2–6 cm. long, obtuse, pubescent beneath: fls. 1 cm. long. (*M. hupehensis* Takeda.) C. China. Intr. 1908. Zone V.—**M. Faùriei** Takeda. Tree to 8 m.: lfts. 9–17, elliptic-ovate to oblong, 3–5.5 cm. long, glabrous at maturity: fls. 1 cm. long: pod 3–4.5 cm. long. Not. Bot. Gard. Edinb.8:t.27,f.39 43. (*Cladrastis F.* Lév.) Korea. Intr. 1917. Zone V?—*M.* **Tashirôi** Mak. Shrub: lfts. 11 15, elliptic-ovate, 2–4 cm. long, slightly pubescent beneath: fls. 7 mm. long: pod 2 3.5 cm. long. Tokyo Bot. Mag.6:t.10. Japan, Liukiu Isls. Intr. 1919. Zone V?

7. **CLADRÁSTIS** Raf. Deciduous trees; winter-buds naked, several superposed covered by the base of the petiole: lvs. odd-pinnate; lfts. 7–15, alternate, short-stalked, entire, rather large: fls. white, rarely pinkish, in usually panicled racemes; calyx campanulate, 5-toothed; stamens 10, nearly free: pod narrow-oblong, dehiscent, compressed, 3–6-seeded; valves thin. (Greek *klados*, branch, and *thraustos*, fragile, alluding to the brittle brs.) Four species in N. Am. and E. Asia.

A. Lvs. without stipels: pod not winged.
B. Panicles drooping: lfts. 7–9 ..... 1. *C. lutea*
BB. Panicles upright: lfts. 9–13 ..... 2. *C. sinensis*
AA. Lvs. with stipels: pod winged ..... 3. *C. platycarpa*

1 **C. lûtea** K. Koch. YELLOW-WOOD. Tree to 15, rarely to 20 m. high, with smooth bark and yellow wood: lfts. 7–9, elliptic or ovate, 7–10 cm. long, abruptly short-acuminate, broad-cuneate, glabrous, bright green: fls. white, 2.5–3 cm. long, fragrant, in panicles 25–40 cm. long: pod 7–8 cm. long. Fl.VI; fr.VIII–IX. B.M.7767(c). S.S.3:t.119, 120. G.F.1:92(h). G.C. III.42:186(h),187. Gg.2:401;5:98(h). (*C. tinctoria* Raf., *Virgilia l.* Michx.) N. C. to Ky. and Tenn. Intr. 1812. Zone V.—Planted as an ornamental tree for its fragrant white fls. and handsome foliage turning yellow in autumn.

2. **C. sinénsis** Hemsl. Tree to 25 m.: lfts. 9–13, oblong to oblong-lanceolate, 5–10 cm. long, obtuse or acutish, usually rounded at base, grayish green beneath and brownish pubescent chiefly near the midrib; petioles and rachis pubescent: fls. white or pinkish, 1.2 cm. long, in much-branched panicles 12–30 cm. long; ovary glabrous: pod 4–6.5 cm. long. Fl.VII; fr.IX. B.M. 9043(c). G.C.III.74:70. H.B.2:439. K.B.1913:164,t(h). Fls.VI–VII. W. and C. China. Intr. 1901. Zone V.

A related species is **C. Wilsônii** Takeda. Tree to 15 m.: lfts. 7–9, elliptic-ovate to ovate-oblong, 6–12 cm. long, broad-cuneate to rounded at base, nearly glabrous: fls. 1.5–2 cm. long, in panicles 12–18 cm. long; ovary pubescent: pod very shortly stipitate. C. China. Intr. 1907. Zone VI?

3. **C. platycârpa** Mak. Tree to 20 m.: lfts. 7–15, ovate to elliptic-lanceolate, 5–10 cm. long, acuminate, broad-cuneate to rounded at base, slightly pubescent above chiefly on the veins, green beneath, slightly reticulate and appressed-pilose; petioles 2–2.5 cm. long: fls. 1–1.5 cm. long, in upright panicles about 15 cm. long; standard white with yellow spot at base; pod winged all around, 3–7 cm. long, 1–3-seeded. S.I.2:t.32(c). (*Sophora p.* Maxim., *Platyosprion platycarpum* Mak.) Japan. Intr. 1919. Zone V.

8. **SÓPHORA** L. Deciduous or evergreen trees or shrubs, rarely herbaceous; winter-buds small, indistinctly scaly: lvs. odd-pinnate: lfts. opposite, usually small, 7–many; stipules small: fls. in racemes or panicles, calyx with 5 short teeth; standard orbicular to oblong-obovate; stamens 10, free or connate only at base; pod stipitate, terete, rarely compressed, constricted between the seeds, indehiscent or tardily dehiscent, few to many-seeded. (Sophera, Arabian name of a tree with pea-shaped fls.) Including *Styphnolobium* Schott and *Goebelia* Bge. About 20 species in Asia and N. Am.

A. Fls. in large terminal panicles, yellowish white or slightly pinkish; lfts. acute. 1. *S. japonica*
AA. Fls. in racemes: lfts. obtusish or emarginate.
B. Lfts. about 3 cm. long: racemes axillary: unarmed small tree ..... 2. *S. affinis*
BB. Lfts. about 1 cm. long; racemes terminal: spinescent shrub ..... 3. *S. viciifolia*

1. **S. japónica** L. JAPAN PAGODA-TREE. Tree to 25 m., with spreading brs. forming a round head; young brts. glabrous or nearly so, green: lvs. 15–25 cm. long; lfts. 7–17, stalked, ovate to lance-ovate, 2.5–5 cm. long, acute, broad-cuneate to rounded at base, dark green and lustrous above, glaucous beneath and closely appressed-pubescent: fls. 1–1.5 cm. long, in terminal loose panicles 15–30 cm. long; pod stipitate, 5–8 cm. long, terete, glabrous, 1–6-seeded. Fls.VIII–IX; fr.X. S.I.1:t.50(c). N.D.3:t.21(c). Gn.24: 210, 214(h). M.G.13:183(h). F.E.12:1174(h). B.S.2:250(h). (*Styphnolobium japonicum* Schott.) China, Korea. Intr. 1747. Zone V.—Var. **péndula** Loud. A picturesque form with tortuous limbs and pendulous brs. R.H.1876:194, 195(h). Gn.24:202, 203(h);89:184(h). G.C.III.28:479(h). F.E.14:1430,t.

43(h). Gn.M.29:167(h).—Var. **columnàris** Schwerin. Of narrow pyramidal habit.—Var. **violàcea** Carr. Lfts. 15–17, appressed-pubescent beneath: fls. appearing very late, the wings and keel tinged purplish. (*S. violacea* Hort., not Thwait.) Intr. 1858.—Var. **pubéscens** Bosse. Lfts. ovate-oblong to lance-ovate, usually rounded or truncate at base, to 8 cm. long, soft-pubescent beneath: wings and keel of the fl. often tinged purplish. M.D.1922:t.20(h). (*S. p.* Tausch, *S. Korolkowii* Hort., *S. sinensis* Hort., *S. tomentosa* Hort., not L.) Cult. 1830.—Late-flowering ornamental tree, sometimes used as an avenue tree: remaining green late into the autumn.

2. **S. affìnis** Torr. & Gray. Round-headed tree to 6 m.: lvs. 10–20 cm. long; lfts. 13–19, elliptic, 2–4 cm. long, obtusish to emarginate, mucronate, broad-cuneate, glabrous or with scattered hairs beneath and conspicuously veined: fls. white, tinged with pink, 1–1.5 cm. long, in slender racemes 5–15 cm. long: pods 3–8 cm. long, pubescent, black. Fl.VI. S.S.3:t.122. Ark. and Tex. Intr. 1890. Zone VII?

3. **S. viciifòlia** Hance. Shrub to 2.5 m., with spreading spinescent brs. and pubescent brts.: lvs. 2–6 cm. long; lfts. 13–19, elliptic to elliptic-oblong, 6–10 mm. long, obtuse and mucronulate, silky-pubescent beneath or nearly glabrous: fls. bluish violet to whitish, 1.6–2 cm. long, in 6–12-fld. racemes terminal on short brts.; calyx pubescent, shortly 5-toothed, violet; standard spatulate-obovate, reflexed: pod 5–6 cm. long, 1–4-seeded, long-beaked, nearly glabrous. Fls.VI; fr.IX–X. B.M.7883(c). G.C.III.36:3. Gn.78:469;88:107(h). A.F.29:155. B.S.2:522. (*S. Davidii* Kom., *S. Moorcroftiana* var. *Davidii* Franch.) W. China. Intr. 1897. Zone V.—Graceful free-flowering shrub adapted for sandy soil and dry situations.

Probably not now in cult. is **S. Wilsònii** Craib. Shrub to 2 m.: lfts. 13–19, oblong, 2–4.5 cm. long, obtuse, ferrugineous-pubescent beneath: fls. pale yellow, 1.5–2 cm. long, in axillary dense racemes to 7 cm. long: pod ellipsoid, 2–3 cm. long without stipe. W. China. Intr. 1908.—Probably not hardy within our area is **S. secundiflòra** Lag. with evergreen lvs. and violet-blue fls. in terminal racemes from Tex. and N. Mex. to n. Mex.

Tribe 2. PODALYRIEAE Taub. Lvs. usually ternate; stamens free; petals of keel free or slightly connate.

9. **PIPTÁNTHUS** Don. Deciduous or half-evergreen shrubs: lvs. 3-foliolate; stipules connate; lfts. entire, sessile: fls. yellow, in terminal upright bracted racemes; calyx campanulate, 5-toothed, with lanceolate equal teeth, deciduous; petals long-clawed, wings obovate; keel obovate-oblong, connate on back; standard orbicular, erect; stamens free: ovary linear, 6–10-ovuled; pod linear, flattened, stipitate. (Greek *piptos*, to fall, and *anthos*, flower; petals, stamens and teeth of calyx drop soon.) Five species in the Himal. and S. W. China.—Ornamental shrubs with showy yellow fls.

P. cóncolor Harrow. Shrub to 2 m.; young brts. white-pubescent, soon glabrous: lvs. ovate-lanceolate to lance-oblong, 5–12 cm. long, acuminate, cuneate, slightly pubescent when young, soon glabrous, green on both sides; petiole 1.5–2.5 cm. long: fls. about 2.5 cm. long, in dense racemes 5–8 cm. long; calyx silky-villous: pod 8–12 cm. long, glabrous. Fl.IV–V. W. China. Intr. 1908. Zone VII?

Closely related species are: **P. tomentósus** Franch. Young brts. tomentose: lfts. ovate to ovate-lanceolate, tomentose, finally nearly glabrous above: pod tomentose, 5–8 cm. long. S. W. China. Intr. ?—**P. nepalénsis** D. Don. Shrub to 3 m.: lfts. lanceolate, 8–14 cm. long, silky when young, finally glabrate, glaucous beneath; fls. about 3 cm. long; calyx brown-pubescent; pod 8–12 cm. long, slightly pubescent. S.B.3:t.264(c). H.U.1:260,t(c). G.C.III.43:178. R.H.1914:9. Himal. Intr. 1821. Zone VIII?

Tribe 3. GENISTEAE Taub. Lvs. ternate, simple or wanting; petals of keel free or slightly connate on back; stamens usually all connate ½ to ⅔: pod dehiscent or sometimes indehiscent.

10. **LUPÌNUS** L. LUPINE. Herbs, rarely shrubby: lvs. digitate, rarely simple; lfts. 5–15: fls. usually in terminal spikes; calyx deeply 2-lipped, the lower lip 3-toothed or entire; standard erect, broad-ovate, with strongly reflexed sides; wings united at apex and enclosing the keel; stamens connate: pod compressed, dehiscent with several seeds, usually silky-villous. (Ancient Latin name, derived from *lupus*, wolf.) About 300 species chiefly in W. N. Amer., few in E. N. Am., S. Am. and the Mediterranean region.

L. arbóreus Sims. TREE L. Upright shrub to 3 m.; brts. silky: lfts. 7–11, oblanceolate, about 3 cm. long, mucronulate, glabrous above, silky beneath; petioles 2–3 cm. long: fls. sulphur-yellow, fragrant, sometimes tinged bluish, in loose racemes to 25 cm. long; pedicels about 8 mm. long; calyx deeply 2-lipped with entire or slightly bifid lips: pods to 8 cm. long, pubescent, 8–12-seeded. Fls.VII–IX. B.M.682(c). B.R.1595(c). Gn.30:289(h);47:398(h), t(c). Calif. Cult. 1800. Zone VIII.—Several color forms are in cult.

11. **ERINÀCEA** Boiss. Deciduous shrub, with rigid, very spiny pubescent brs.: lvs. simple or ternate, pubescent: fls. 1–3, axillary toward the end of the brts.; calyx tubular, with 5 short teeth, inflated after flowering; petals narrow, long-clawed; claws of wing and keel adnate to the staminal tube; standard ovate, slightly auriculate at base: pod oblong, dehiscent, glandular-hairy, 4–6-seeded. (From Latin *erinaceus*, hedgehock, alluding to the spiny nature of the plant.) One species.

E. pungens Boiss. Dense shrub to 0.3 m.: lvs. present only at ends of young brts.: lfts. oblong-ovate to spatulate, about 1 cm. long: fls. 1–3, violet-blue; 2–2.5 cm. long; corolla about ⅓ longer than calyx: pod about 2 cm. long. Fls.V–VI. B.M.676(c). L.C.318(c). G.C.III.76:89,t(h). Gn.62:127(h); 64:399(h). S. W. Eu., N. W. Afr. Intr. 1759. Zone VI?–VII.—Suited for sunny places in rockeries; likes limestone soil.

12. **SPÁRTIUM** L. Upright shrub with slender, leafless or nearly leafless brs.: lvs. simple, entire, estipulate: fls. in loose terminal racemes; calyx split above, hence 1-lipped, with 5 minute teeth; standard large, obovate, recurved; wings shorter than the acuminate, incurved keel; claws of wings and keel adnate to staminal tube; stigma decurrent on inside of style: pod linear, many-seeded. (From *spartos*, the ancient Greek name of the plant.) One species.

S. júnceum L. SPANISH BROOM. Shrub to 3.5 m., with slender terete grooved rush-like brs.: lvs. oblanceolate to linear, 1–2.5 cm. long, bluish green, sparingly hairy or nearly glabrous: fls. bright yellow, about 2.5 cm. long, fragrant: pod linear, pubescent, 5–10 cm. long. Fls.V–IX; in Calif. almost the whole year. B.M.85(c). B.R:1974. Gn.44:57. B.S.2:523. (*Sparthianthus junceus* Lk.) Mediterr. region and Canary Isls. Intr. 1548. Zone VII–VIII.—Var. **ochroleùcum** Sprenger. Fls. whitish.—Var. **plènum** West. Fls. double. Orig. before 1746. Of no particular ornamental merit.—Almost leafless shrub producing masses of golden yellow fls.

13. **GENÍSTA** L. Deciduous or half-evergreen, sometimes nearly leafless shrubs spiny or unarmed; brts. usually green, striped: lvs. alternate, rarely opposite, simple or sometimes 3-foliolate, entire; stipules small or wanting:

fls. in terminal racemes or heads, rarely axillary, usually yellow, rarely white; calyx 2-lipped, the upper lip deeply 2-parted; standard ovate; keel obtuse; claws of wings and keel adnate to the staminal tube; style incurved, rarely involute, with capitate, rarely slightly decurrent stigma: pod linear-oblong, rarely subglobose or ovate, with convex, rarely flat valves, 1–many-seeded. (Ancient Latin name.) About 100 species in Eu., N. Afr. and W. Asia.

A. Brts. striped, terete.
  B. Lvs. 3-foliolate or partly so.
    C. Lvs. and brts. opposite or whorled: fls. in heads.
      D. Brts. rigid, spiny ..... 1. *G. horrida*
      DD. Brts. not spiny ..... 2. *G. radiata*
    CC. Lvs. alternate: fls. in racemes ..... 3. *G. nyssana*
  BB. Lvs. simple, alternate.
    C. Brts. spiny.
      D. Infl. racemose.
        E. Brts. pilose or villous: bracts of infl. subulate ..... 4. *G. germanica*
        EE. Brts. glabrous: bracts of infl. foliaceous ..... 5. *G. anglica*
      DD. Infl. capitate ..... 6. *G. hispanica*
    CC. Brts. unarmed.
      D. Fls. 1–few on axillary short brts.
        E. Lvs. acute: fls. forming racemes to 20 cm. long at end of brs.: upright shrub. 7. *G. cinerea*
        EE. Lvs. obtuse: racemes short; procumbent shrub ..... 9. *G. pilosa*
      DD. Fls. in many-fld. terminal racemes: lvs. usually glabrous or nearly so beneath. 8. *G. tinctoria*
AA. Brts. triangular or 2-winged: procumbent shrubs.
  B. Brts. triangular, glabrous ..... 10. *G. januensis*
  BB. Brts. 2-winged, pubescent ..... 11. *G. sagittalis*

1. **G. hórrida** DC. Densely branched shrub to 0.3 m., with rigid spiny brts. silky when young: lfts. linear, about 8 mm. long, folded, pubescent: fls. 1–3; keel pubescent; bracts ovate: fr. rhombic-lanceolate, pubescent. Fls. VI–VIII. G.C.III.53:140(h). Gn.87:620(h). S. France, Spain. Intr. 1821. Zone VII or VIII.

2. **G. radiàta** Scop. Much-branched shrub to 0.8 m.; brts. pubescent or glabrescent: lfts. linear-lanceolate, 1–1.5 cm. long, glabrous above, pubescent beneath, caducous: fls. in 3–10-fld. heads; calyx campanulate; bracts ovate: pod elliptic, pubescent, 1–2-seeded. Fls.V–VII. B.M.2260(c). R.I.22:t. 2083(c). F.D.23:t.2318(c). (*Cytisus radiatus* Koch, *Enantiosparton radiatum* K. Koch.) S. E. Eu. Intr. before 1758. Zone (V), VI.

A related species is **G. ephedroïdes** DC. Shrub to 1 m.: lfts. glabrous: fls. in terminal racemes: pod rhombic, 1-seeded, silky. De Candolle, Mem. Legum.t.36. Sardinia, Corsica, Sicily. Cult. 1909. Zone VIII?

3. **G. nyssàna** Petrovich. Shrub to 0.6 m.; brts. villous: lfts. elliptic-lanceolate, 2–3.5 cm. long, villous: fls. in terminal leafy racemes to 20 cm. long; bractlets subulate; teeth of calyx of equal length; keel and standard silky outside: pod rhombic, about 1 cm. long, villous. Fl.VI–VII. I.T.5:t.197. Serbia, Albania. Intr. 1899. Zone VI?

4. **G. germànica** L. Upright or ascending spiny shrub to 0.6 m.; brts. villous, the flowering ones not spiny: lvs. elliptic-oblong, 1–2 cm. long, deep green, ciliate and villous beneath: fls. rather small, in racemes 3–5 cm. long; bracts subulate, half as long as pedicels; keel and standard silky outside; pod elliptic, 8–10 mm. long, few-seeded, villous. Fls.VI–VII. R.I.22:t.2086f.i-ii. D.F.23:t.2302(c). C. and S. Eu. Cult. 1588. Zone V.—Var. **inérmis** Koch. Spineless or nearly so.

A closely related species is **G. silvéstris** Scop. Brts. appressed-pubescent, the flowering ones spiny: lvs. linear to narrow-lanceolate, 1–1.5 cm. long, pubescent beneath: racemes to 10 cm. long; bracts longer than pedicels; calyx with subulate lobes: pod ovoid, usually 1-seeded. R.I.22:t.2084(c). F.D.23:t.2304(c). Styria to Balkan Pen. Intr. 1818. Zone VI?—Var. **pungens** Vis. More spiny. B.M.8075(c). R.I.22:t.2085,f.3. Gn.87:620(h); 88:201(h). (*G. dalmatica* Bartl.) Intr. 1893. Zone VI or VII?

5. **G. ánglica** L. Glabrous spiny shrub to 0.8 m., sometimes procumbent: lvs. elliptic to linear-oblong, 6–8 mm. long, bluish green: racemes few-fld., with leafy bracts longer than the pedicels; pod elliptic-oblong, about 1 cm. long, several-seeded. R.I.22:t.2086,f.3–5(c). D.F.23:t.2303(c). S.E.3:t.326 (c). C. and W. Eu. Cult. 1789. Zone V.—Var. **subinérmis** Legrande. Nearly or quite spineless.

6. **G. hispànica** L. Densely branched shrub to 0.3 m., with numerous thin spines: lvs. ovate-lanceolate, to 1 cm. long, pubescent: fls. in 2–12-fld. heads: calyx pubescent, divided about ½ into lance-ovate teeth: pod rhombic, hirsute. B.M.8528(c). R.I.22:t.2085,f.i-ii(c). R.H.1888:36,t(c). E.S.1:589. Gn.86:256(h);87:621(h). M.G.22:388(h). S.L.212(h). Spain to N. Italy. Intr. 1759. Zone VI.

7. **G. cinérea** DC. Shrub to 0.9 m.; brts. grooved, pubescent when young; sparingly leafy: lvs. lanceolate, 6–8 mm. long, acute, pubescent on both sides: fls. 1–3, subsessile or very short-stalked, on axillary leafy brts. forming at end of last season's brs. racemes to 20 cm. long; bractlets lanceolate, caducous; calyx pubescent; keel pubescent: pod to 1.8 cm. long, silky, 2–5-seeded. Fl.IV–VII. B.M.8086(c). R.I.22:t.2092,f.1–2(c). Gn.83:400;86: 564(h). S. Eu., N. Afr. Intr. before 1850. Zone VII?

Related species are: **G. ténera** Ktze. Shrub to 4 m.: lvs. lanceolate to elliptic, about 1 cm. long, silky: fls. stalked, in numerous short 3–6-fld. racemes; calyx silky: pod oblong, to 2–2.5 cm. long, silky, 3–5-seeded. Fl.VII–VIII. B.M.2265(c). B.R.30:11(c). B.S.1:593. Gn.85:111(h). (*G. virgata* Lk., *Spartium virgatum* Ait., *Cytisus tener* Jacq.) Madera. Intr. 1777. Zone VII or VIII.—**G. aethnénsis** DC. Nearly leafless shrub to 6 m.; brts. glabrous or glabrescent, bright green: lvs. linear: fls. 1–2: pod glabrous at maturity, about 1 cm. long, 1–3-seeded. Fls.VII–VIII. B.M.2674(c). Gn.43:212,t(c). Sardinia, Sicily. Cult. 1826. Zone VII or VIII.

8. **G. tinctòria** L. Dyer's Greenweed. Upright or ascending shrub to 1 m., with slender little-branched shoots; brts. striped, glabrous or pubescent when young: lvs. elliptic-oblong to oblong-lanceolate,1–2.5 cm. long, nearly glabrous, ciliate, bright green: racemes many-fld., sometimes branched; corolla glabrous: pods narrow-oblong, compressed, glabrous or slightly pubescent, 6–10-seeded. Fls.VI–VIII. R.I.22:t.2088,f.1–2(c). F.D.23:t.2299(c). S.E.3: t.328(c). B.C.3:1322. (*G. sibirica* Hort., *G. polygalaefolia* Hort., not DC.) Eu., W. Asia; sometimes naturalized in the E. States. Cult. 1789. Zone IV.—Var. **plèna** Rehd. With double fls. R.H.1899:573. G.W.16:137(h). (*G. sibirica fl. pleno* Pépin.) Orig. before 1853.—Var. **hirsùta** DC. More branched; brts. and lvs. pubescent; ovary pubescent: pod usually glabrate. (*G. pubescens* Lang.)—Var. **anxántica** Fiori. Dwarf and quite glabrous: lvs. narrow-elliptic. S.L.115(h). S.B.II.266(c). (*G. a.* Ten.) Italy. Intr. 1818. —Var. **virgàta** Koch. More vigorous and more branched, to 2 m.; quite glabrous; pod 3–6-seeded. R.I.22:t.2088,f.3(c). F.D.23:t.2300(c). (Var. *elatior* Schultz, var. *elongata* Rouy, *G. elata* Wender., *G. virgata* Willd., *G. elatior* Koch., ?*G. sibirica* L.) Cult. 1790.—Var. **alpéstris** Bertol. Low, with slender procumbent brs.: lvs. narrow: ovary glabrous or pubescent: pod glabrous or glabrate. S. Eu.—Var. **humílior** Schneid. Similar to the preceding, but pod silky-villous. R.I.22:t.2088,f.4(c). (Var. *mantica* Reichenb., *G. mantica* Poll.) Italy. Intr. 1816.

A closely related species is **G. ovàta** Waldst. & Kit. Ascending or upright shrub, to 0.6 m.; brts. villous: lvs. ovate to lanceolate, villous; pod villous, rarely glabrate. G.O.t.59(c). R.I.22:t.2089,f.3–4(c). L.B.482(c). D.F.23:t.2301(c). (*G. tinctoria* var. *o.* Schultz.) S. France to Rumania. Intr. 1819. Zone V or VI.

9. **G. pilòsa** L. Prostrate shrub with rooting verruculose stems and short angled ascending brts.: lvs. obovate to oblong, 6–15 mm. long, obtusish,

cuneate, appressed-pubescent beneath, dark green and nearly glabrous above: fls. 1–3, axillary, forming short racemes; calyx silky; keel and standard pubescent outside: pod linear, to 2.5 cm. long, silky, 5–8-seeded. Fls.v–vii. R.I. 22:t.2093,f.1–2(c). S.E.3:t.327(c). Gn.87:562(h). S.L.213(h). Eu. Cult. 1789. Zone V.

10. **G. januénsis** Viv. Low, with procumbent stems and ascending triangular slightly winged glabrous brts. 5–20 cm. long: lvs. lance-ovate to lanceolate, to 2 cm. long, with transparent margin; stipules spinescent: fls. in short racemes; bracts longer than pedicels: pod oblong, glabrous, 3–8-seeded. Fl.v–vi. R.I.22:t.2091(c). F.D.23:t.2298(c). L.B.1135(c). (*G. triangularis* Willd., *G. scariosa* Viv., *G. triquetra* Waldst. & Kit.) Italy, S. E. Eu. Cult. 1826. Zone VII?

11. **G. sagittàlis** L. Low shrub with procumbent stems and ascending or erect broadly 2-winged villous brts. to 0.3 m. high: lvs. ovate to oblong, about 2 cm. long, villous: fls. in short, 6–8-fld. terminal racemes; corolla glabrous except the pubescent keel; pod linear-oblong, 1–2 cm. long, silky, 3–6-seeded. Fl.vi; fr.viii. R.I.22:t.2081(c). F.D.23:t.2320(c). (*Saltzwedelia s.* Gaertn., Mey. & Scherb., *Cytisus s.* Koch.) C. and S. Eu. Cult. 1588. Zone V.

14. **PETTÈRIA** Prsl. Deciduous upright shrub; winter-buds naked, silky: lvs. petioled, 3-foliolate; lfts. entire, subsessile, stipulate: fls. yellow, in terminal upright racemes; calyx tubular, shortly 2-lipped, upper lip split to base, lower lip 3-toothed; claws of wings and keel adnate to staminal tube; ovary sessile, pubescent: pod linear-oblong, flat, dehiscent, with several seeds. (Named for Franz Petter, Dalmatian botanist; died 1853.) One species.

P. ramentàcea Prsl. Shrub to 2 m.; brts. glabrous, green: lfts. narrow-elliptic to obovate-oblong, 2–6 cm. long, usually obtuse, glabrous, ciliate, dark green above, lighter beneath; petiole 2–4 cm. long: fls. fragrant, short-pediceled, in dense racemes 3–7 cm. long; calyx silky; keel silky: pod to 4.5 cm. long, sparingly silky or glabrate. Fls.v–vi. R.I.22:t.2070(c). F.D.23:t. 2307(c). B.R.29:40(c). (*Cytisus ramentaceus* Sieb., *Laburnum ramentaceum* K. Koch, *Genista r.* Briq.) Istria to Albania. Intr. 1838. Zone (V).

15. **LABÚRNUM** Med. Deciduous trees or shrubs: winter-buds globose-ovoid, with 2–3 outer scales: lvs. alternate, 3-foliolate, petioled, estipulate; lfts. subsessile: fls. yellow, slender-pediceled, in terminal usually pendulous racemes; calyx 2-lipped with obtuse short lips; petals all free; stamens 10, connate; ovary stipitate: pod linear, compressed, tardily dehiscent, with thickened slightly winged margin; seeds several, without appendage. (Ancient Latin name.) Three species in S. Eu. and W. Asia.—Ornamental trees or shrubs; the first two species with very showy pendulous racemes of golden yellow fls.

A. Racemes pendulous: lfts. elliptic to oblong, 2–8 cm. long.
B. Brts., lvs. beneath and pod appressed-pubescent. . . . . 1. *L. anagyroides*
BB. Brts., lvs. and pod glabrous or nearly so. . . . . 2. *L. alpinum*
AA. Racemes upright: lfts. obovate, 5–15 mm. long. . . . . 3. *L. caramanicum*

1. **L. anagyroides** Med. Golden-chain. Large shrub or tree to 7 m.; brts. appressed-pubescent, grayish green: lfts. elliptic to elliptic-oblong or elliptic-obovate, 3–8 cm. long, usually obtuse and mucronulate, broad-cuneate, grayish green and silky-pubescent beneath when young; petioles 2–6 cm. long: fls. about 2 cm. long, in silky-pubescent racemes to 30 cm. long; pedicels usually shorter than fls.: pod about 5 cm. long, with thick keel,

appressed-pubescent; seeds black. Fls.v–vi. F.D.23:t.2305(c). H.W.3:100. G.C.III.36:318. Gn.34:30;79:246(h);88:15(h). R.H.1912:446a. S.L.t.11(hc). (*L. vulgare* Bercht. & Prsl., *Cytisus Laburnum* L.—Bean-tree.) S. Eu. Cult. 1560. Zone (V).—Var. **aùreum** Rehd. Lvs. yellow. F.S.21:t.2242–3(c). G.Z.20:129,t(c). Orig. before 1875.—Var. **bullàtum** Schneid. Lfts. curled and bullate. (*L. vulgare involutum* Hort.) Orig. before 1847.—Var. **quercifòlium** Schneid. Lfts. sinuately lobed. Deutsch. Mag. Gart. Blumenk. 1853. 43.t(c). Gn.34:30. S.H.2:f.25c[1]. Orig. before 1838.—Var. **sessilifòlium** Schneid. Lvs. crowded, subsessile. Orig. before 1847.—Var. **péndulum** Rehd. Brs. pendulous. Gn.25:522(h). G.M.45:317. Orig. before 1840.—Var. **autumnàle** Rehd. Blooming a second time in autumn. (*L. vulgare* var. *bifera* Lav., var. *semperflorens* Nichols.)—Var. **Alschíngeri** Schneid. Lfts. more silky and more bluish gray beneath; racemes shorter, often nearly upright; lower lip of calyx longer than upper one. R.I.32:t.2066,f.1,2(c). S.H.2:f. 25d-e,26a-b[1]. S. Eu. Intr. 1840.—Var. **Carlièri** Schneid. (in part). Lfts. smaller and narrower, obovate to narrow-oblanceolate on same br.: fls. in slender racemes; calyx slightly pubescent; ovary glabrous. Orig. before 1864. Schneider and Dippel confused it partly with var. *Alschingeri*.

L. a. × *alpinum* = **L. Waterèri** Dipp. Lfts. beneath and racemes sparingly pubescent; racemes long and slender: pod with narrow wing, sparingly appressed-pubescent, few-seeded, rarely developed. G.24:355. G.M.45:313. Gs.2:109(h). (*L. Parksii* Hort.) Orig. before 1864. Zone V.—*L. a.* × *Cytisus purpureus* = *Laburnocytisus Adamii;* see below.

2. **L. alpìnum** Bercht. & Prsl. Scotch Laburnum. Shrub or tree to 10 m.; brts. glabrous or hirsute when young, green: lfts. usually elliptic-oblong, 4–7 cm. long, acute or acutish, ciliate, light green and glabrous or sparingly pilose beneath: fls. less than 2 cm. long, in slender glabrous or sparingly pilose racemes to 40 cm. long; pedicels about as long as fls.: pod thin, with the upper suture winged, glabrous; seed brown. Fl.vi. F.D.23:t.2366(c). B.M.176(c, as *Cytisus Laburnum*). Gn.34:30;88:16(h). R.H.1912:446b. B. S.2:2,t(h). (*Cytisus alpinus* Mill.) Mts. of S. Eu. Cult. 1596. Zone V.—Var. **lùcidum** Kirchn. Lfts. lustrous above.—Var. **péndulum** Kirchn. Brs. pendulous.—This species is of more upright stiffer growth, with slenderer racemes flowering about two weeks later; hardier.

3. **L. caramànicum** Benth. & Hook. Upright shrub to 2 m.; glabrous; brts. terete: lfts. obovate, 5–15 mm. long, mucronulate, grayish green; petioles 3–10 mm. long: fls. about 1.5 cm. long, in terminal slender racemes 5–15 cm. long; pedicels 5–8 mm. long, with small bractlets in the middle; pod winged on the upper suture, 5–7, glabrous. Fl.viii. B.M.7898(c). R.H.1861:410. G.C.III.48:454. B.S.2:2. (*Podocytisus caramanicus* Boiss. & Heldr., *Cytisus c.* Lav.) Greece, Asia Minor. Cult. 1861. Zone VII? or VIII.

× **LABURNOCÝTISUS** Schneid. (*Cytisus* × *Laburnum*). Known only in the following form: **L. Adàmii** Schneid. (*Laburnum anagyroides* × *C. purpureus.*) Habit similar to *L. anagyroides*: lfts. smaller, nearly glabrous; racemes smaller, nodding; fls. usually dull purplish; often developing brs. like true *L. anagyroides*, less often like *C. purpureus*. B.R.1965(c). B.H.21: 16–18(c). G.C.III.36:219;50:162. M.O.t.10. (*Laburnum A.* Kirchn., *Cytisus A.* Poir., *C. Laburnum* var. *purpurascens* Loud.) Orig. about 1826. Zone V or VI.—One of the graft-hybrids of the kind recently termed chimaeras; a very interesting plant, but of little ornamental value.

16. **CALYCÓTOME** Lk. Deciduous low spiny shrubs; brts. often opposite: lvs. 3-foliolate, petioled, estipulate; lfts. sessile, small: fls. solitary or

fascicled; calyx turbinate, truncate, colored; standard upright; keel obtuse, curved, shorter than standard; filaments connate; ovary sessile; stigma capitate: pod linear-oblong; thickened or 2-winged on upper suture, dehiscent, several-seeded. (Greek *kalyx* and *tome*, cut or section; the upper part of the calyx separates before the flower opens.)—Five species in the Mediterr. region.

C. spinòsa Lk. Shrub to 1.5 m.; brts. glabrous: lfts. obovate-oblong or obovate, to 1.2 cm. long, obtuse, cuneate, sparingly pubescent beneath; petioles 3–6 mm. long: fls. 1–4, about 1 cm. long; bracts 3-lobed: pod 2–3 cm. long, glabrous. Fl.III–VII. R.I.22:t.2067(c). B.R.32:55(c). S.L.130(h). S. Eu. Cult. 1846. Zone VII or VIII.—Ornamental shrub, excellent for low hedges.

Closely related species are: **C. villòsa** Lk. Young brts. and lfts. beneath silky; calyx, pedicels and pod silky-villous: fls. 3–15. R.I.22:t.2067(c). E.N.III.3:f. 109a-c. S. Eu., N. Afr. Cult. 1893.—**C. infésta** Guss. differs in its appressed-silky pubescence. D.L.2:670. Italy to Greece. Intr. ?

17. **ADENOCÁRPUS** DC. Deciduous or half-evergreen shrubs or small trees, more or less pubescent: lvs. 3-foliolate, small; stipules caducous: fls. yellow, in terminal racemes; calyx 2-lipped, the 2 upper lobes distinct, the 3 lower ones more or less connate; standard orbicular, spreading; keel strongly incurved, nearly as long as standard; pod sessile, linear or oblong, compressed, viscid-glandular, many-seeded. (Greek *aden*, gland, and *karpos*, fruit; in reference to the glandular pod.) About 10 species in the Mediterr. region and on the high mts. of trop. Afr.

A. decórticans Boiss. Divaricately branched shrub or small tree to 8 m.; bark exfoliating; brts. tomentose: lvs. very crowded; lfts. linear, 8–18 mm. long, with usually involute margin, pubescent; petiole 6–12 mm. long: fls. golden-yellow, in short dense upright racemes 3–6 cm. long; calyx villous, its segments nearly equal; pod 3.5–5 cm. long. Fl.VI. R.H.1883:156,t(c). G.C.II.25:725. Gn.30:498. Spain. Cult. 1879. Zone VIII.

The related **A. complicàtus** Gay is a much-branched shrub to 1 m.; brts. glabrescent: lfts. obovate to oblong-lanceolate, pubescent beneath: fls. in elongated racemes; calyx pubescent, usually glandular; middle segment of lower lip longer than the lateral ones, usually much exceeding the upper lip. Fl.VII–VIII. R.I.22: t.2055,f.1(c). B.M.1387(c). (*A. divaricatus* Sweet, *A. parvifolius* DC.) S. Eu. Cult. 1780. Zone VII.

18. **CÝTISUS** L. Deciduous or evergreen shrubs, rarely small trees; unarmed, rarely with spinescent brts.: lvs. 3-foliolate, rarely 1-foliolate, sometimes minute or nearly wanting; stipules minute or wanting: fls. yellow or white, rarely purple, axillary or in terminal racemes or heads; calyx 2-lipped with short teeth, the upper 2 connate or free; petals all free; keel obtuse or slightly acuminate; stamens connate; ovary sessile, rarely stipitate; style incurved, with capitate or oblique stigma; pod linear to oblong, flattened, dehiscent, 2–many-seeded; seed with callous appendage. (*Kytisos*, Greek name for a kind of clover.) About 50 species chiefly in the Mediterr. region extending to C. Eu. and Canary Isls. Ornamental shrubs grown for their usually profusely produced fls.

A. Calyx campanulate, as long or slightly longer than wide: brts. grooved or angled.
  B. Fls. axillary along the brs.
    C. Style longer than keel, spirally incurved: fls. 2–2.5 cm. long, usually solitary. (Sect. 1. SAROTHAMNUS Benth.) ..... 1. *C. scoparius*
    CC. Style shorter than keel, slightly curved: fls. smaller.
      D. Habit procumbent; leafy shrubs: fls. yellow.
        E. Lvs. simple. (Sect. 2. COROTHAMNUS Nym.) ..... 2. *C. decumbens*
        EE. Lvs. 3-foliolate. (Sect. 3. TRIANTHOCYTISUS Griseb.)
          F. Lfts. less than 1 cm. long, like the calyx and pod villous. (Lvs. simple in × *C. Beanii*.) ..... 3. *C. Ardoinii*

FF. Lfts. usually more than 1 cm. long, like the brts. and calyx sparingly appressed-pubescent. ....4. *C. glabrescens*
DD. Habit upright; almost leafless shrubs; lvs. often partly 1-foliolate. (Sect. 4. Spartothamnus Webb & Berth.)
E. Fls. white: pod appressed-pubescent. ....5. *C. multiflorus*
EE. Fls. yellow: pod glabrous. ....6. *C. purgans*
BB. Fls. in terminal racemes. (Sect. 5. Phyllocytisus Koch.)
C. Lvs. of flowering brts. sessile: glabrous shrub, racemes 4–12-fld. ....7. *C. sessilifolius*
CC. Lvs. all petioled: brts., lfts. beneath, calyx and pod appressed-pubescent. 8. *C. nigricans*
AA. Calyx tubular, much longer than wide: lvs. always 3-foliolate: brts. terete, not striped. (Sect. 6. Tubocytisus DC.)
B. Fls. yellow or white: pubescent shrubs.
C. Fls. in terminal heads with bracts at base, appearing in summer, only occasionally producing axillary fls. in spring; standard silky-pubescent outside.
D. Fls. yellow.
E. Brts. and petioles villous. ....9. *C. supinus*
EE. Brts. and petioles appressed-pubescent. ....10. *C. austriacus*
DD. Fls. white or whitish. ....11. *C. albus*
CC. Fls. axillary along the brs.; standard glabrous or slightly pubescent outside.
D. Brts. and calyx with more or less spreading hairs: lvs. pubescent above.
E. Pubescence of brts. of villous spreading hairs: pod villous. ....12. *C. hirsutus*
EE. Pubescence of brts. of partly appressed and partly spreading hairs: pod appressed silky-villous. ....13. *C. elongatus*
DD. Brts., calyx and pod appressed-silky: lfts. glabrous above. ....14. *C. ratisbonensis*
BB. Fls. purple, rarely white: glabrescent procumbent shrub. ....15. *C. purpureus*

1. **C. scopàrius** Lk. Scotch Broom. Upright shrub with slender green brs. pubescent when young: lfts. obovate to oblanceolate, 8–15 mm. long, sparingly appressed-pubescent, the upper lvs. often reduced to 1 lft.: fls. usually 1–2, bright yellow; standard orbicular, 2 cm. across; pedicels and calyx nearly glabrous: pod narrow-oblong, 3.5–5 cm. long, glabrescent, villous on the margins. Fls.v–vi. R.I.22:2082(c). F.D.23:2294(c). G.25:169. M.D. 1916:t.64(h);1917:t.7(h). (*Sarothamnus s.* Wimm., *Spartium scoparium* L.) C. and S. Eu. Long cult. and occasionally naturalized in the E. States, also on Vancouver.—Var. **albus** G. Don. Fls. yellowish white or nearly white. (Var. *ochroleucus* Zabel, var. *pallidus* hort.) Orig. before 1830.—Var. **sulphùreus** Nichols. "Moonlight Broom." Dwarfer and more compact, with pale sulphur-yellow fls. Gn.61:299;65:375. G.M.44:580.—Var. **Andreànus** Dipp. Fls. yellow with crimson wings. R.H.1886:373,t.(c). Gn.42:188,t(c). Gt.40:t.1342(c). R.B.19:129,t(c). S.L.381(h). Intr. about 1870.—Var. **plènus** Rehd. Fls. double. (Var. *fl. pleno* Loud.) Cult. 1838.—Var. **péndulus** Nichols. With prostrate brs. or pendulous when grafted high. Gn.11:433(h). S.L.381(h). (*Sarothamnus s.* f. *prostrata* Schneid., *C. grandiflorus* Hort., *Genista prostrata* Hort.)—Showy in bloom with its large yellow fls.

C. s. var. *Andreanus* × *multiflorus* = *C. Dallimorei;* see under No. 5.

2. **C. decúmbens** Spach. Prostrate shrub to 0.2 m.; brts. 5-angled, sparingly villous: lvs. sessile, oblong-obovate, 8–20 mm. long, pilose beneath, less so above: fls. 1–3, bright yellow, 1–1.5 cm. long; calyx sparingly pilose; standard obovate: pod 2–2.5 cm. long, pubescent, 3–4-seeded. Fls.v–vi. B.M.8230(c). R.I.22:2080,f.3–4(c). L.B.718(c). (*Genista d.* Willd., *G. Halleri.*) S. Eu. Intr. 1775. Zone V.

The closely related **C. procúmbens** Spreng. differs chiefly in its appressed pubescence. (*C. Kitaibelii* Vis. in part.) S. E. Eu. Intr. ?

3. **C. Ardoìnii** Fournier. Low decumbent shrub, to 0.2 m. high; brts. slightly grooved, villous; lfts. obovate to oblong, about 8 mm. long, villous; petioles about 6 mm. long: fls. 1–3, golden-yellow; calyx villous; standard suborbicular: pod 2–2.5 cm. long, villous, usually 2-seeded. Fls.iv–v. Moggridge, Fl. Mentone, t.58(c). S.H.2:f.28h,30a-e. S. E. France. Intr. 1866. Zone VI or VII.

C. A. × *multiflorus* = **C. kewénsis** Bean. Procumbent, to 0.3 m. high; lvs. sometimes simple; lfts. linear-oblong, pubescent: fls. creamy white or pale sulphur-

yellow. Fls.v. Gn.73:228(h);86:244(h);87:93(h). G.W.16:610. G.M.51:355. Orig. 1891.—*C. A.* × *purgans* = **C. Beànii** Nichols. Semi-prostrate, to 0.4 m. high; brts. pubescent when young; lvs. simple, linear, about 1 cm. long, pubescent: fls. 1–3, deep golden yellow. B.S.1:457. G.30:207. Orig. 1900.

4. **C. glabréscens** Sart. Spreading low shrub, rarely to 1 m.; brts. angular, glabrous; lfts. elliptic-oblong or obovate, 1–2 cm. long, obtuse, sparingly hairy beneath; petiole 1–2.5 cm. long: fls. 1–4, yellow, about 1.2 cm. long; pedicels about as long, pubescent: pod 2.5–3.5 cm. long, glabrous; seed with very small appendage. Fl.v–vi. B.M.8201(c). R.I.22:2071(c). B.S.2:588. S.L.173(h). (*C. emeriflorus* Reichenb., *Genista g.* Briq.) Switzerl., N. Italy. Cult. 1890. Zone V.

5. **C. multiflòrus** Sweet. White Spanish Broom. Shrub occasionally to 3 m., with upright slender grooved brts. pubescent when young: lvs. short-petioled, 3-foliolate on the lower part of the brts., simple above; lfts. oblong-obovate to linear-oblong, about 1 cm. long or less, sparingly silky-pubescent: fls. 1–3, white, about 1 cm. long, profusely produced; pedicels about 1 cm. long: pod about 2.5 cm. long, appressed-pubescent, 2–6-seeded. Fl.v–vi. Gn.64:251(h);89:311(h). G.W.5:111. G.M.49:579(h). (*C. albus* Link, *C. Linkii* Janka, *Genista alba* Lam., *Spartium multiflorum* Ait.) Spain, N. Afr. Intr. 1752. Zone VII?—Var. **incarnàtus** Sweet. Fls. slightly blushed. L.B. 1052(c).—Var. **dùrus** Aschers. & Graebn. A hardier race. (*C. albus durus* Simon-Louis.) Orig. before 1870.

C. m. × *purgans* = **C. praècox** Bean. Lvs. usually simple, short-stalked, oblanceolate to linear-spatulate, 8–20 mm. long, silky-pubescent: fls. 1–2, yellowish white or sulphur-yellow, about 1 cm. long, of unpleasant odor. G.C.III.29:41(h). Gn.69:318(h). M.G.18:265(h). Orig. about 1867. Zone VI?—Var. **albus** Smith. Dwarfer and more pendulous; fls. white. Gn.75:192.—Var. **lùteus** Smith. Dwarf; fls. yellow.—Very floriferous and handsome.—*C. m.* × *scoparius Andreanus* = **C. Dallimòrei** Rolfe. Shrub similar to *C. scoparius*: lvs. usually 3-foliolate, pubescent: fls. 1–2, about 1.5 cm. long, yellow suffused with pink, the wings crimson; calyx brown, slightly pubescent; pedicels about 6 mm. long, pubescent. B.M.8482(c). G.C.III.51:198. Gn.74:291. Orig.1900. Zone V or VI.—*C. m.* × *Ardoinii* = *C. kewensis;* see under No. 3.

6. **C. púrgans** Benth. & Hook. Dense shrub to 1 m., with upright stiff grooved brs. pubescent when young: lvs. usually simple, soon falling, sessile, oblanceolate, 6–12 mm. long, silky-pubescent: fls. 1–2, yellow, about 1 cm. long, fragrant; pedicels half as long, pubescent: pod 2–2.5 cm. long, pubescent, 3–4-seeded. Fl.v–vii. B.M.7618(c). L.B.1117(c). Gn.86:243(h). (*Genista p.* L.) Spain, S. France, N. Afr. Cult. 1750. Zone (V).

C. p. × *Ardoinii* = *C. Beanii;* see under No. 3.—*C. p.* × *multiflorus* = *C. praecox;* see under No. 5.

7. **C. sessilifòlius** L. Upright shrub to 2 m., glabrous; brts. angled: lvs. nearly sessile on flowering brts., with petioles up to 2 cm. long on leafy shoots; lfts. obovate or elliptic to oblong-obovate, 8–20 mm. long, usually rounded at apex, bright green: fls. bright yellow, about 1.2 cm. long, short-stalked in 4–12-fld. racemes terminal on short brts.: pod about 3 cm. long, glabrous. Fl.vi. B.M.255(c). R.I.22:2072(c). F.D.23:2309(c). B.S.1:463. (*Lembotropis s.* K. Koch.) S. Eu., N. Afr. Cult. 1600. Zone VI.—Var. **leucánthus** Dipp. Fls. yellowish white. (*C. Lobelii* Tausch.) Cult. 1864.

8. **C. nígricans** L. Upright shrub to 2 m.; brts. terete, appressed-pubescent; lfts. obovate to oblong-obovate, 1–3 cm. long, acutish, slightly appressed-pubescent beneath; petioles 6–20 mm. long: fls. yellow, about 1 cm. long, slender-stalked, in terminal racemes 8–30 cm. long; pedicels 4–8 mm. long, pubescent: pod about 3 cm. long, pubescent. Fl.vi–vii. B.M.8479(c). R.I. 22:2071(c). F.D.23:2308(c). B.S.1:460. S.L.173(h). C. and S. Eu. Intr.

1730. Zone V.—Var. **elongàtus** Willd. Blooming again in fall at the end of the fruiting brs. R.H.1891:149. (Var. *longespicatus* Hort., var. *Carlieri* Hort.) Cult. 1800.

9. **C. supìnus** L. Shrub to 1 m., upright or sometimes procumbent; brts. terete, villous: lfts. obovate or elliptic to oblong-obovate, 1.5–2.5 cm. long, sparingly appressed-pubescent above, villous beneath; petioles about 1 cm. long, villous: fls. yellow, brownish when fading, 2–2.5 cm. long, in terminal heads with bracts at base; occasionally developing in spring axillary fls.: standard silky outside; pod about 3 cm. long, villous. Fl.VI–VIII. R.I.22: 2075(c). F.D.23:2313(c). (*C. capitatus* Scop.) C. and S. Eu. Intr. 1755. Zone V.

10. **C. austríacus** L. Shrub to 1 m., similar to the preceding; brts., petioles and lvs. appressed-silky or sometimes brts. with slightly spreading hairs: lfts. elliptic-oblong to lanceolate, 1.5–3 cm. long, appressed-pubescent on both sides: fls. bright yellow, always capitate; standard silky outside; calyx villous: pod appressed-pubescent. Fl.VII–VIII. R.I.22:2078,f.1–2(c). F.D.23:12(c). S. E. Eu., Cauc. Intr. 1741. Zone V.—Var. **Heuffèlii** Schneid. Slenderer shrub: lfts. smaller, linear-oblong, slightly pubescent above: pod more silky. R.I.22:2078,f.3(c). (*C. H.* Wierzb., *C. supinus* var. *H.* Briq.) Hungary. Cult. 1918.

11. **C. albus** Hacq. (not Link). Spreading shrub to 0.3 m.; brts. with appressed or slightly spreading pubescence: lfts. obovate to oblong, 1–2 cm. long, acutish or obtusish, sparingly pubescent above or nearly glabrous, appressed-pubescent: fls. white or yellowish white, nearly 2 cm. long, 3–10 in a terminal head; calyx appressed-villous: pod 2–2.5 cm. long, appressed-villous. Fl.VI–VII(–X). B.M.1438(c). R.I.22:2078,f.4(c). (*C. leucanthus* Waldst. & Kit., *C. schipkaensis* Dieck, *C. leucanthus* var. *schipkaensis* Dipp.) S. E. Eu. Intr. 1806. Zone V.—Var. **pállidus** Rehd. Fls. pale yellow. (*C. p.* Schrad.)

A closely related species is **C. Rochèlii** Wierzb. Shrub to 1 m.; brts., calyx, and pod villous: lfts. oblong-lanceolate, to 3 cm. long: fls. pale yellow with brownish spots. (*C. leucanthus* var. *obscurus* Roch.) Hungary. Cult. 1878.

12. **C. hirsûtus** L. Shrub to 0.6 m.; brts. villous: lfts. obovate or elliptic to obovate-oblong, 1–2 cm. long, acute to obtuse, villous beneath, slightly so or nearly glabrous above: fls. yellow, about 2.5 cm. long, in axillary clusters of 2–4; standard stained with brown in centre; calyx villous: pod about 3 cm. long, villous. Fl.V–VI. B.M.6819(c, but lfts. not serrate). F.D.23: 2315(c). (*C. falcatus* Waldst. & Kit.) S. E. Eu. Cult. 1739. Zone V.—Var. **hirsutíssimus** Boiss. A more vigorous upright form; brts. more densely villous; lfts. more pubescent above. (*C. h.* K. Koch.) S. E. Eu.

C. h. × *purpureus* = *C. versicolor;* see under No. 15.—*C. h.* × *ratisbonensis* = *C. cetius;* see under No. 13.

A closely related species is **C. ciliàtus** Wahlb., but the lfts. are nearly glabrous or glabrous above and the pods pubescent only at the sutures. S. E. Eu. Intr. 1817.

13. **C. elongàtus** Waldst. & Kit. Shrub to 1.5 m.; brts. with a more appressed tomentum mixed with longer spreading hairs: lfts. obovate to oblong-elliptic, to 2.5 cm. long, more or less appressed-pubescent on both sides: fls. 2–5; standard with reddish brown marks; calyx mostly with spreading and fewer appressed hairs: pod appressed silky-villous. R.I.22:2073(c). B.R.1191(c). (*C. ratisbonensis* var. *e.* K. Koch, *C. hirsutus* subsp. *e.* Briq., *C. multiflorus* Lindl.) C. to S. E. Eu. Intr. 1804. Zone V.—Hybrids between *C. hirsutus* and *C. ratisbonensis* = **C. cètius** Beck, are very difficult to distinguish from this species.

A closely related species is **C. leiocárpus** Kern. Ascending shrub to 0.3 m.; brts. glabrescent: lfts. elliptic or obovate, glabrous above, glabrescent beneath; calyx glabrescent: pod glabrous. Hungary. Cult. 1902.

14. **C. ratisbonénsis** Schaeff. Shrub to 2 m.; brts. appressed silky-pubescent: lfts. oblong-obovate to elliptic-oblong, 1.5–3.5 cm. long, glabrous above, appressed-silky beneath, ciliate: fls. 2–4, bright yellow, 2.5–3 cm. long; calyx appressed-silky: pod densely appressed-pubescent. Fl.v–vi. R.I.22:2074,f. 1–3(c). F.D.23:2314(c). (*C. hirsutus* subsp. *r.* Briq.) C. Eu. to W. Siberia and Caucasus. Intr. about 1800. Zone V.—Var. **biflórus** Zabel. Of more upright habit; lfts. lanceolate-oblong to lanceolate: fls. paler: fr. more silky. B.R.308(c). S. E. Eu. Intr. 1760. Zone V.

C. r. × *hirsutus* = *C. cetius;* see under No. 13.

15. **C. purpúreus** Scop. Procumbent shrub with ascending brs., to 0.5 m.; glabrous or nearly so: lfts. obovate-elliptic to obovate-oblong, 6–25 mm. long, dark green above, often slightly ciliate; petioles to 2.5 cm. long: fls. 1–3, about 2 cm. long, purple; calyx sparingly pubescent: pod 2.5–3.5 cm. long, glabrous. Fl.v–vi. R.I.22:2072(c). F.D.23:2316(c). B.M.1176(c). G.C. III.36:217;50:163. Gn.21:421. B.S.1:462,t(h). S. Austria, N. Italy. Intr. 1792. Zone V.—Var. **albus** Kirchn. Fls. white. Gn.21:421. G.6:433. Orig. before 1838.—Var. **albo-cárneus** Kirchn. Fls. pale pink. S.L.174(h). (Var. *roseus* Hort., var. *carneus* Hort.) Orig. before 1840.—Var. **atropurpúreus** Dipp. Fls. dark purple.—Var. **eréctus** Kirchn. Habit upright. Orig. before 1840.—Var. **elongâtus** André. With long and slender brts. and violet-purple fls. (Var. *pendulus* Dipp.) Sometimes grafted high on Laburnum. Cult. 1872.

C. p. × *hirsutus* = **C. versícolor** Dipp. Upright or spreading shrub to 1 m.; similar to *C. purpureus;* brts. sparingly villous; lfts. glabrous above, sparingly villous beneath; petioles 1–1.5 cm. long, sparingly villous: fls. light purple and yellowish, usually the standard whitish, keel light purple and wings yellowish; calyx villous: pod more or less villous. S.L.175(h). Orig. before 1860. Zone V.

19. **ÙLEX** L. Furze. Very spiny much-branched shrubs; brts. grooved, ending like all their ramifications in sharp spines: lvs. reduced to a spiny petiole, only on seedlings and occasionally on vigorous shoots developed and 3-foliolate; stipules wanting: fls. 1–2, axillary, often forming terminal racemes, yellow; calyx 2-lipped to base, membranous, colored, persistent; standard ovate, wings and keel obtuse; stigma capitate: pod small, dehiscent, few-seeded; seed with appendage. (Ancient Latin name.) About 20 species in W. Eu.

A. Petals 1½ as long as calyx; calyx villous: fls. in spring.....1. *U. europaeus*
AA. Petals about as long or little longer than calyx; calyx minutely silky; fls. in autumn.
B. Standard about 1.2 cm. long; wing longer than keel; spines stout.....2. *U. Gallii*
BB. Standard 8–10 mm. long; wing shorter than keel; spines short and thin....3. *U. nanus*

1. **U. europaèus** L. Dense, much-branched rigid and very spiny shrub, to 1, rarely to 2 m. tall; axillary brts. stout with the spiny tip 2–3 cm. long: young brts. hairy; petioles linear-lanceolate, 6–12 mm. long: fls. solitary, golden-yellow; pedicels hairy, about 6 mm. long; bracts ovate; standard 1.5 cm. or more long: pod about 1.5 cm. long, exceeding the calyx. Fl.iv–vi, sometimes again in autumn. R.I.22:2068(c). S.E.3:t.323(c). G.H.t.123(c). G.W.17:286. S.L.412(h). C. and W. Eu.; naturalized in the middle Atlantic States and on Vancouver. Long cult. Zone VI.—Var. **plènus** Schneid. With double fls. Gn.63:441;89:172(h). G.M.52:393. (Var. *fl. pleno* Loud.) Orig. about 1828.—Var. **stríctus** Webb. Of upright columnar habit; fls. but sparingly. (*U. fastigiatus* Hort., *U. hibernicus* Hort.) Intr. about 1815.

2. **U. Gállii** Planch. (? *U. europaeus* × *nanus*). Shrub to 0.5 m., similar

to the preceding; spiny tip of axillary brts. not exceeding 1.5 cm.; brts. hairy: fls. bright yellow; calyx minutely silky; wings curved, longer than keel: pod about 1 cm., scarcely exserted. Fl.VIII–IX. F.S.5:441(h). Ann. Sci. Nat. III.11,t.9. W. Eu. Intr. after 1850. Zone VII.

3. **U. nànus** Forst. Dwarf shrub, sometimes procumbent, to 0.6 m. tall; spiny tip of lateral brts. usually not more than 5 mm. long; brts. hairy, with thin and very dense ramifications: fls. golden-yellow; wings straight and shorter than keel; calyx puberulous: pod about 1 cm. long, enclosed in the calyx. Fl.VIII–IX. R.I.22:2068(c). S.E.3:t.325. B.S.2:610. W. Eu. Cult. 1789. Zone VII.

Rarely cult. is **U. parviflòrus** Pourr. To 1 m.; brts. nearly glabrous, axillary spines often simple, straight: fls. orange-yellow; standard 5–8 mm. long. R.I.22: t.2068(c). S.H.2:f.35l. S. W. Eu. Cult. 1904. Zone VII or VIII.—Var. **provinciàlis** Aschers. & Graebn. is a slenderer form (*U. p.* Lois.).

Tribe 4. TRIFOLIEAE Taub. Lvs. 3-foliolate; lfts. denticulate: stamens all connate or the upper stamen partly or quite free; petals of keel free or slightly connate on back: pod usually dehiscent.

20. **ONÒNIS** L. Herbs or deciduous shrubs, pubescent and often glandular: lvs. 3-foliolate, rarely pinnate; lfts. denticulate; stipules adnate to petiole, conspicuous: fls. purple to white or yellow, axillary, 1–3, often racemose or paniculate at end of brts.; calyx deeply 5-parted; standard large, suborbicular; keel usually rostrate, incurved; stamens all connate; ovary stipitate, 2–many-ovuled; style incurved with capitate or oblique stigma; pod usually swollen. (Ancient Greek name.) More than 70 species, chiefly Mediterranean, extending to N. Eu. and to the Canary Isls.

O. fruticòsa L. Shrub to 0.6 m.; brts. soon glabrous: lfts. sessile, oblong-ovate to oblanceolate, to 2.5 cm. long, glabrous, grayish green; stipules 2–4-toothed: fls. light rose or whitish with red veins, 1.5–2 cm. long, 2–3 on slender peduncles forming glandular-pubescent terminal panicles; calyx glandular-pubescent, reddish; pod 2–2.5 cm. long, hairy. Fl.VI–VIII. R.122:t.53(c). B.M.317(c). G.C.III.47:420. S.L.277(h). S. Eu., N. Afr. Intr. before 1680. Zone V or VI.

The following species differ in their orbicular lfts., the middle one distinctly stalked: **O. aragonénsis** Asso. Shrub to 0.3 m.: lfts. about 1 cm. long, glabrous: fls. yellow, about 1 cm. long, short-stalked, 1–2 axillary in terminal racemes 6–14 cm. long: pod about 6 mm. long, glandular-hairy. B.S.2:108. Spain, Algeria. Intr. 1816. Zone VII?—**O. rotundifòlia** L. Subshrub to 0.5 m.; brts. glandular-villous: lfts. 1–3.5 cm. long, slightly glandular-villous: fls. bright rose, about 2 cm. long, 2–4 in axillary peduncled clusters forming terminal leafy panicles: pod to 3 cm. long, very hairy. R.I.22:t.54(c). F.D.23:t.2330(c). B.M.335(c). S. Eu. Cult. 1600. Zone V.

21. **MEDICÀGO** L. Herbs or rarely deciduous shrubs: lvs. 3-foliolate; lfts. usually denticulate; stipules adnate to petiole: fls. yellow or violet, in axillary heads or racemes; calyx short, with nearly equal teeth; standard obovate or oblong; wings longer than the obtuse keel; ovary sessile or short-stipitate; stigma terminal, oblique: pod spirally twisted or curved, indehiscent, several-, rarely 1-seeded. (From the country Media.) About 50 species in C. and S. Eu., W. Asia and Afr.

M. cretàcea Bieb. Ascending subshrub to 0.25 m.; brts. sparingly appressed-pubescent: lfts. broad-obovate, scarcely more than 8 mm. long, rounded and mucronate at apex, entire or nearly so, pubescent on both sides: fls. about 7 mm. long, yellow, in many-fld. subcapitate racemes on peduncles shorter than the lvs.; calyx villous: pod falcate, compressed, to 1 cm. long, appressed-

pubescent or glabrescent. Fl.v–vi. Marschall von Bieberstein, Cent. Pl. Ross.t.76. S.L.271(h). Crimea, Tauria. Cult. 1908. Zone VI?

Probably not hardy in our area is **M. arbórea** L. Shrub to 4 m.; lfts. about 1.5 cm. long, silky-pubescent beneath: fls. about 1 cm. long, in few-fld. heads; pod spirally curved, glabrous. L.B.1379(c). S. Eu., W. Asia.

Tribe 5. Loteae Taub. Lvs. pinnate or digitate; lfts. entire: filaments all or only 5 dilated at apex; otherwise like the preceding tribe.

22. **ANTHÝLLIS** L. Herbs or evergreen or deciduous shrubs: lvs. 3-foliolate or odd-pinnate, rarely 1-foliolate; stipules wanting or minute: fls. yellow, white or purple, in axillary heads or clusters; calyx tubular, often inflated after anthesis, with nearly equal teeth, or the 2 upper ones longer and partly connate; standard ovate; wings ovate, longer than the obtuse or apiculate keel, usually adnate to the staminal tube; stamens at first all connate, the upper stamens becoming partly or wholly free; ovary usually stipitate; stigma terminal: pod ovate to linear, enclosed in the calyx or slightly exserted, 1 or few-seeded, indehiscent or tardily 2-valved. (Ancient Greek name.) More than 20 species in the Mediterr. Region.

A. Hermánniae L. Deciduous densely branched shrub, to 0.5 m., with tortuous spinescent brs. pubescent when young: lfts. usually 1, oblanceolate, 1–2.5 cm. long, obtuse, silky-pubescent on both sides: fls. orange-yellow, about 8 mm. long, 3–5 in axillary short-stalked clusters; calyx appressed-pubescent: pod oblong, glabrous, 5 mm. long. Fl.vi–vii. B.M.2576(c). S.F.t.683(c). Corsica to Asia Minor. Intr. about 1700. Zone VII or VIII. —Var. **Aspálathi** Rouy. Less pubescent, more spiny; infl. 1–3-fld. S.L.100(h). (*Aspalathus cretica* L.) Cult. 1910.—Low shrub suited for sunny rockeries.

23. **DORÝCNIUM** Adans. Herbs or subshrubs: lvs. 3-foliolate or apparently digitate; the stipules leaf-like and sometimes not different from the lfts.; lfts. entire: fls. white or pink, small, in axillary peduncled umbels or heads, sometimes crowded at end of brts.; calyx with 5 subequal teeth or slightly 2-lipped; standard oblong-ovate; wings oblong-obovate, connate at apex; keel obtusish, incurved; upper stamen free; ovary sessile, 2–many-ovuled; style incurved with capitate stigma: pod oblong to linear, terete, dehiscent. (Ancient Greek name of a poisonous plant.) About 12 species in the Mediterr. Region and on the Canary Isls.

D. suffruticòsum Vill. Ascending subshrub, to 0.4 m.; stems slender, appressed pubescent when young: lvs. sessile; lfts. including the similar stipules 5, oblanceolate, those on upper part of the brts. linear, 8–20 mm. long, silky-pubescent, grayish green: fls. pinkish white, about 6 mm. long, subsessile, in 10–12-fld. heads on axillary slender stalks 3–6 cm. long at end of stems; calyx silky pubescent: pod subglobose, 1-seeded, about 3 mm. long. Fl.vi–ix. R.I.22:t.137,f.4,5(c). F.D.23:t.2409(c). S. Eu. Intr. before 1650. Zone V.—Var. **seríceum** Beck. Lower, procumbent at base: lfts. broader, the upper ones not different: pedicels more than ½ as long as calyx; standard 5–7 mm. long. (*D. germanicum* Rouy.) Switzerl. to Balkan Pen.

Related species are: **D. réctum** Ser. Subshrub to 1 m., villous or glabrescent: lfts. obovate, 1.5–2 cm. long; petiole to 1 cm. long; stipules about as long: standard about 4–5 mm. long; pod cylindric, glabrous. Mediterr. Reg. Cult. 1800.— **D. hirsùtum** Ser. Stems hirsute; lfts. obovate to oblong, 2–2.5 cm. long, hirsute beneath; stipules elliptic-ovate, much longer than the very short petiole: fls. white, about 1.5 cm. long, in 6–10-fld. heads; peduncle hirsute: pod about 8 mm. long, usually 4-seeded. R.I.22:t.134,f.1–3(c). S.F.8:t.759(c). (*Cytisus Lotus* Hort.) S. Eu. Intr. 1680. Zone V.

Tribe 6. GALEGEAE Taub. Lvs. 3-foliolate or pinnate; the upper stamen usually free; filaments not dilated at apex; otherwise like the preceding tribe.

24. **INDIGÓFERA** L. Deciduous shrubs, subshrubs or herbs, more or less clothed with 2-armed appressed hairs and sometimes also with simple hairs: lvs. usually odd-pinnate, rarely 3-foliolate or 1-foliolate; lfts. usually opposite, short-petioluled, entire, sometimes stipellate; stipules usually small, subulate, adnate at base to petiole: fls. usually pink to purple, in axillary racemes; bracts caducous; calyx small, oblique, with 5 nearly equal teeth or the lowest one longer; standard orbicular to oblong; wings oblong, slightly adhering to keel which has a swelling or spur on either side; ovary sessile or nearly so; anthers with apiculate connective: pod subglobose to linear-oblong, terete or angular, rarely compressed, dehiscent, inside with thin partitions. ("Indigo-bearing"; some species yield indigo.) About 300 species in trop. and subtrop. regions of both hemispheres.—Several species are very ornamental shrubs; even if killed back in colder climates to the ground, young shoots springing from the base flower and fruit the same season. Some species yield indigo.

A. Lfts. 5–13.
  B. Lfts. glabrous above.
    C. Lfts. elliptic-ovate to lance-ovate, acute to obtuse ..... 1. *I. decora*
    CC. Lfts. broad-oval to oblong, rounded or emarginate at apex ..... 2. *I. hebepetala*
  BB. Lfts. pubescent on both sides.
    C. Fls. 1.5–2 cm. long; peduncle longer than petiele ..... 3. *I. Kirilowi*
    CC. Fls. 6–8 mm. long; keel and wings caducous.
      D. Peduncle about as long as petiol ..... 4. *I. Potaninii*
      DD. Peduncle much shorter than petiole ..... 5. *I. amblyantha*
AA. Lfts. 13–27.
  B. Lfts. 13–21, 1–1.5 cm. long: racemes upright ..... 6. *I. Gerardiana*
  BB. Lfts. 21–27, 2–3.5 cm. long: racemes pendulous ..... 7. *I. pendula*

1. **I. decòra** Lindl. Shrub to 0.5 m.; brts. reddish brown, terete, glabrous: lfts. 7–13, elliptic to ovate-lanceolate, 2.5–7cm. long, acutish or obtuse, mucronate, dark green above, pale beneath and sparingly appressed-pubescent: fls. pink, 1.5–2 cm. long, in slender racemes with the peduncle 10–20 cm. long; peduncle much longer than petiole; pedicels about 6 mm. long; calyx glabrous, with triangular lobes; standard oblong, white, pale crimson toward base, wings pink: pod glabrous. Fl.VII–VIII. B.M.5063(c). B.R.32:22 (c). P.M.16:290(c). China, Japan. Intr. 1846. Zone VII?; usually killed back in winter.—Var. **alba** Sarg. Fls. white. G.F.7:375. B.C.3:1645. Intr. about 1878. Zone (V); killed back in winter.

A closely related species is **I. reticulàta** Koehne, not Franch. Lvs. oval to ovate-oblong, reticulate beneath and sparingly appressed-pubescent, finally nearly glabrous: fls. about 1 cm. long, white; anthers pilose at apex. (*I. decora* Hort. nonn., ? *I. venulosa* Champ.) ? China. Intr. before 1890.

2. **I. hebepétala** Benth. Shrub to 1 m. or taller; stems pubescent when young, soon glabrous: lfts. 7–9(5–11), broad-ovate to oblong, 2.5–6 cm. long, rounded or emarginate at apex, sparingly appressed-pubescent beneath: fls. 1–1.5 cm. long, in rather dense racemes 8–20 cm. long, on the upper part of the shoot; peduncle about as long as petiole; standard crimson, pubescent outside, wings and keel rose-colored; calyx with short triangular teeth, pilose: pod 3–5 cm. long, linear-oblong, 8–10-seeded. Fl.VIII–IX. B.M.8208(c). I.T.6:t.219. M.O.t.11. Himal. Cult. 1881. Zone VII.

3. **I. Kirilówi** Maxim. Shrub to 1 m. or taller; brts. slightly angular, slightly pubescent when young, soon glabrous: lfts. 7–11, suborbicular to obovate or elliptic, 1–3 cm. long, mucronate, broad-cuneate or rounded at base, rounded at apex, bright green above, sparingly appressed-pubescent on both sides:

fls. rose-colored, about 2 cm. long, in rather dense racemes to 12 cm. long, about as long as leaf; peduncle about twice as long as petiole; calyx 3 mm. long, with unequal lanceolate teeth, slightly pubescent: pod linear-oblong, 3–5.5 cm. long. Fl.vi. B.M.8580(c). B.C.3:1646. M.G.27:271(h). N. China, Korea. Intr. 1899. Zone V.—Var. **coreàna** Craib. Racemes nearly twice as long as lvs.; calyx 4 mm. long, with narrower teeth. Korea. Intr.?

4. **I. Potanínii** Craib. Upright shrub to 1.5 or taller; brts. densely appressed-pubescent at first, soon glabrescent: lfts. 5–9, elliptic-oblong to oblong or obovate-oblong, 1–3 cm. long, rounded and mucronate at apex, cuneate or broadly cuneate at base, grayish green beneath, appressed-pubescent; stipules minute; petiole 1.5–2.5 cm. long: fls. lilac-pink, about 8 mm. long, in racemes 5–12 cm. long; calyx short, the lowest tooth somewhat longer than tube; pedicels 1–2 mm. long: pod up to 3.5 cm. long, glabrate. Fl.vi–vii. N. W. China. Intr.?

A related species is **I. Souliéi** Craib. Lfts. oval to elliptic-oblong, 1–2 cm. long: fls. nearly 1 cm. long, in stalked racemes to 15 cm. long; pedicels 3–4 mm. long: pod about 2 cm. long, glabrous. W. China. Intr. 1910. Zone VI?

5. **I. amblyántha** Craib. Shrub to 2 m.; brts. angled, appressed-pubescent with whitish hairs: lfts. 7–11, elliptic to oblong-elliptic, 1–3.5 cm. long, rounded and mucronate at apex, broad-cuneate, bright green above, glaucescent beneath, appressed-pubescent; petiole 3–4 cm. long: fls. pale lilac-purple, 6–7 mm. long, in dense racemes 6–10 cm. long, shorter than lf.; standard obovate; calyx appressed-pubescent: pod linear-oblong, 3.5–5 cm. long, pubescent. Fl.vii–x. China. Intr. 1908. Zone V.

A related species is **I. macrostáchya** Vilm. & Bois, not Vent. Brts. terete, appressed-pubescent: lfts. 9–13, elliptic-oblong or obovate-oblong, 1.5–2.5 cm. long: fls. about 8 mm. long, pink, in short-peduncled racemes longer than lf.; wings and keel not caducous. ? China. V.F.53. Intr. 1900.

6. **I. Gerardiàna** Wall. Much-branched shrub to 1 m. or taller; brts. slightly ribbed, appressed-pubescent: lfts. 13–21, oval or obovate to oblong-oblanceolate, 1–1.5 cm. long, rounded or emarginate and mucronulate at apex, appressed-pubescent on both sides: fls. about 1 cm. long, rosy-purple, short-stalked, in rather dense racemes 7–15 cm. long; teeth of calyx equal, lanceolate; standard pubescent outisde: pod deflexed at maturity, 3–5 cm. long, 6–10 seeded. Fl.vii–ix. B.R.28:57(c). (*I. dosua* Lindl., not Ham.) Himal. Cult. 1840. Zone VI?; usually cut back in winter.

A closely related species is **I. quadrangulàris** Grah. Lfts. 9–17: pod obtusely quadrangular. Himal. Cult. 1890?

7. **I. péndula** Franch. Shrub to 3 m.; young brts. appressed-puberulous and lenticellate: lvs. to 25 cm. long; lfts. 21–27, elliptic-oblong, 2–3.5 cm. long, rounded at ends, punctulate above, appressed-pubescent beneath, thin: fls. rosy-purple, 1.3 cm. long, in pendulous peduncled racemes to 45 cm. long; calyx appressed-pubescent; standard elliptic-oblong, silky outside: pod 5 cm. long, sparingly strigillose. Fl.viii–ix. B.M.8745(c). W. China. Intr. 1914. Zone VII?; killed back in winter.

Related species are: **I. galegoides** Ham. Lfts. 13–15, elliptic to ovate-oblong, 2–3 cm. long, appressed-pubescent on both sides: fls. about 8 mm. long, pink, in slender upright racemes 20–25 cm. long. S. W. China, Himal. Intr. 1919.—**I. caudàta** Dunn. Brts. and rachis of lf. and infl. pubescent: lfts. 7–9, ovate-lanceolate, 4–8 cm. long, acute, glabrous above: racemes 18–30 cm. long: fls. white, 8–10 mm. long: pod pubescent, 5 cm. long. S. W. Asia. Intr. about 1900. Zone VII?

25. **AMÓRPHA** L. Deciduous shrubs or subshrubs, rarely herbs: lvs. odd-pinnate; lfts. small, entire; stipules subulate, caducous: fls. small, bluish violet or whitish or dark purple, in dense terminal often panicled spikes;

bracts subulate, caducous; calyx short-campanulate, with 5 equal or unequal teeth, usually gland-dotted; wings and keel wanting; ovary sessile, 2-ovuled: pod short, usually 1-seeded, indehiscent, usually gland-dotted; seed glossy. (Greek *amorphos*, deformed; alluding to the incomplete corolla.) About 15 closely related species in N. Am., s. to Mex.

A. Lowest pair of lfts. close to stem: brts. and lvs. pubescent.
B. Calyx-lobes subulate-lanceolate, subequal, nearly as long as tube .....1. *A. canescens*
BB. Calyx-lobes shorter, the upper ones very short, triangular. . .....2. *A. herbacea*
AA. Lowest pair of lfts. some distance from the stem.
B. Calyx-lobes lanceolate, subequal, at least half as long as tube: pod 5 mm. long: plant glabrescent.....3. *A. microphylla*
BB. Calyx-lobes very short, the upper ones broad-triangular or semiorbicular: pod 6–9 mm. long.
C. Brts., petioles and lfts. above glabrous or nearly so; calyx-lobes obtuse.....4. *A. glabra*
CC. Brts., petioles and lfts. more or less pubescent, at least when young.
D. Pubescence spreading; lfts. mostly rounded at base.....5. *A. fruticosa*
DD. Pubescence closely appressed; lfts. cuneate at base.....6. *A. fragrans*

1. A. canéscens Nutt. LEAD-PLANT. Subshrub to 1 m.; brts. angled, densely grayish pubescent: lvs. spreading, curved, 5–12 cm. long; lfts. 15–45, elliptic to oblong-lanceolate, 7–20 mm. long, acute or obtuse, rounded at base, densely grayish villous on both sides: fls. blue, in dense, short-peduncled clustered spikes 3–15 cm. long; calyx villous; standard cuneate-obovate, 5 mm. long; pod with straight back, 4 mm. long, villous. Fl.VI–VII. B.M. 6618(c). M.M.5:t.6(c). B.B.2:366. Mich. and Sask. to Ind., Tex. and N. Mex. Intr. 1912. Zone II or I.

2. **A. herbàcea** Walt. Shrub to 1.5 m.; brts. grooved, finely grayish pubescent: lvs. spreading, 4–16 cm. long; lfts. 11–37, elliptic to oblong, 1–2.5 cm. long, rounded at ends, finely grayish pubescent on both sides, black-dotted and reticulate beneath: fls. white to violet-purple, in finely pubescent clustered racemes 10–30 cm. long; calyx villous, the 2 upper lobes triangular, the lower ones subulate; standard cuneate-obovate, 4–5 mm. long: pod with nearly straight back, 4–5 mm. long, puberulous, with conspicuous dark glands. Fl.VI–VII. L.B.689(c). S.H.2:f.42a-b,43b-c. (*A. pubescens* Willd., *A. pumila* Michx.) N. C. to Fla. Cult. 1820. Zone VI?

3. **A. microphýlla** Pursh. Shrub to 1 m.; brts. glabrous: lvs. 3–10 cm. long, crowded; lfts. 13–19, elliptic to oblong, 5–1.2 cm. long, rounded or emarginate and mucronate at apex, cuneate or rounded at base, glabrous, punctate beneath: fls. purple, in usually solitary racemes, 5–10 cm. long; calyx glabrous; standard cuneate-obovate, 4 mm. long: pod straight on back, 5 mm. long, conspicuously glandular. Fl.V–VI. B.B.2:f.2505. Clements, Rocky Mts. Fl. t.29,f.4. S.H.2:f.42h-k,43a. (*A. nana* Nutt.) Man. and Sask. to Iowa and N. Mex. Intr. 1811. Zone I?

4. **A. glábra** Poir. Glabrous shrub to 2 m.; brts. purplish, sometimes slightly hairy; lvs. 7–16 cm. long; lfts. 9–19, oval to elliptic-ovate, 2–5 cm. long, rounded or emarginate at apex, rounded or subcordate at base: fls. purple, in usually clustered racemes 6–15 cm. long; calyx with ciliate undulately toothed margin; standard suborbicular, cuneate, 7 mm. long: pod nearly straight on back, 7–8 mm. long, with few small glands. Fl.V–VI. S.H.2:f. 44d,45a-b. (*A. montana* Boynt.) N. C. and Tenn. to Ga. and Ala. Cult. 1800. Zone V.

A related species is **A. caroliniàna** Croom. Shrub to 2 m.: lfts. 11–25, oval, 1–2.5 cm. long, rounded at ends, conspicuously glandular-punctate beneath: fls. blue, in usually solitary racemes 5–15 cm. long; standard obovate: pod conspicuously gland-dotted. S.H.2:f.42s-u,43e-e′,44e. (*A. glabra* Boynt., not Desf.) N. C. to Fla. Cult. 1848.

5. **A. fruticòsa** L. Shrub to 6 m.; brts. sparingly pilose, becoming glabrate:

lfts. 11–25, oval or elliptic, 1.5–4 cm. long, rounded at ends, mucronate, finely pubescent or glabrate: fls. purple-blue in clustered spikes 7–15 cm. long; calyx sparingly pilose or glabrate; standard orbicular-obovate, about 6 mm. long: pod curved, 7–9 mm. long. Fl.v–vi. B.R.427(c). B.B.2:f.2504. Conn. to Minn., s. to La. and Fla. Intr. 1724. Zone V.—Var. **albiflòra** Sheldon. Fls. white.—Var. **coerùlea** Mouillef. Fls. pale blue.—Var. **péndula** Dipp. Brs. pendulous or recurved. (*A. p.* Carr.) Cult. 1870.—Var. **crìspa** Kirchn. Lfts. with curled margin.—Var. **croceo-lanàta** Mouillef. Young brts. and young lvs. with yellowish brown villous pubescence; lfts. narrower. W.D.2:139(c). (*A. c.* Wats.) Cult. 1825.

A related species is **A. tennesseeénsis** Shuttlew. Brts. finely pubescent: lfts. 13–55, elliptic to narrow-oblong, 1–2.5 cm. long, sparingly and finely pubescent; calyx finely pubescent; standard 4.5 mm. long: pod slightly curved, 5–7 mm. long, conspicuously gland-dotted. S.H.2:f.43f,44f-g,45c-d. N. C. to Mo., Ga. and La. Cult. 1848.

6. **A. frágrans** Sweet. Shrub to 0.3 m.; brts. appressed grayish pubescent: lfts. 9–27, elliptic to narrow-oblong, 2–4 cm. long, acute to rounded at apex, cuneate, strigillose on both sides: fls. purple-blue, in racemes 5–15 cm. long; calyx minutely puberulous, soon glabrous; standard 4.5–5 mm. long: pod 6–8 mm. long, conspicuously glandular, strongly curved. Fl.vi. B.M.2112 (c, as *A. nana*). S.B.1:t.241(c). (*A. angustifolia* Brongn., *A. fruticosa* var. *a.* Pursh.) Ill. to Mont., s. to Tex. and N. Mex. Cult. 1819. Zone V.

26. **WISTÀRIA** Nutt. Wistaria. Deciduous twining shrubs; winter-buds subglobose or ovoid, with about 3 outer scales: lvs. alternate, odd-pinnate; lfts. petiolulate, alternate, stipellate, 9–19; stipules caducous: fls. blue to purplish or white, in pendulous racemes; calyx campanulate, shortly 5-toothed, the lower teeth often longer; standard large, reflexed, usually with 2 callosities at base; wings falcate, auriculate at base; keel obtuse, mucronate; the upper stamen free; style incurved, with terminal subglobose stigma: pod stipitate, elongated, flattened, with several seeds, usually slightly constricted between them, tardily dehiscent. (After Caspar Wistar, Prof. of Anatomy, University of Pennsylvania; 1761–1818.) Syn.: *Wisteria* Nutt., *Kraunhia* Raf., *Diplonix* Raf., *Bradleia* Adans. Seven species in N. Am. and E. Asia.—Ornamental twining shrubs planted for their flowers produced in great profusion in spring.

A. Standard with distinct callosities at base: fls. 1.5–2.5 cm. long, in racemes on short lateral brts.
  B. Pod velvety; pedicels 1–3 cm. long.
    C. Lfts. 13–19, nearly glabrous at maturity ..... 1. *W. floribunda*
    CC. Lfts. 9–13.
      D. Lfts. nearly glabrous at maturity ..... 2. *W. sinensis*
      DD. Lfts. pubescent on both sides: fls. white ..... 3. *W. venusta*
  BB. Pods glabrous; pedicels 6–10 mm. long: lfts. 9–13.
    C. Racemes dense, 4–10 cm. long, glandless; calyx-lobes much shorter than the broad tube ..... 4. *W. frutescens*
    CC. Racemes elongated, 20–30 cm. long, glandular; calyx-lobes nearly as long as the narrow-campanulate tube ..... 5. *W. macrostachys*
AA. Standard without callosities at base and not auricled: fls. white, 1–1.3 cm. long, in axillary racemes ..... 6. *W. japonica*

1. **W. floribúnda** DC. Japanese W. Tall climber, to 8 m. or more: lfts. 13–19, ovate-elliptic to ovate-oblong, 4–8 cm. long, acuminate, rounded at base, rarely broad-cuneate, appressed-pubescent when young, soon nearly glabrous: fls. violet or violet-blue, 1.5–2 cm. long, in slender racemes, 20–50 cm. long, with the fls. opening gradually from base to apex, fragrant; pedicels 1.2–2.5 cm. long, slightly pubescent; standard broad-oval, auriculate; calyx pubescent, the two upper teeth very short and broad: pod 10–15 cm. long,

narrowed toward the base. Fl.v–vi, sometimes later in season with shorter racemes (*W. brachybotrys* S. & Z.). S.I.2:t.32(c). S.Z.1:t.45(c). F.S.9:t. 880(c). (*W. polystachya* K. Koch, *Kraunhia fl.* Taub., *K. sinensis* var. *fl.* Mak., *W. grandiflora* Hort.) Japan. Intr. 1830. Zone V.—Var. **variegàta** Rehd. & Wils. Lvs. variegated.—Var. **alba** Rehd. & Wils. Fls. white; racemes to 60 cm. long. R.H.1891:421. B.S.2:682,t(h).—Var. **rosea** Rehd. & Wils. Fls. pale pink, tips of keel and wings purple. M.G.16:329(h).—Var. **violaceo-plèna** Rehd. & Wils. With violet double fls. R.H.1887:564,t(c). F.P.1882:t.557(c). Gn.17:105. M.G.16:328.—Var. **macrobótrys** Rehd. & Wils. Lfts. to 10 cm. long: racemes to 1 m., sometimes to 1.5 m. long. F.S. 19:t.2002(c). S.Z.1:t.44(c). G.C.III.69:149. B.S.2:683. Gn.79:293(h);83: 115(h). M.G.18:133(h). (*W. multijuga* Vanh.)—A very ornamental and popular vine; hardier than the following species.

W. f. × *sinensis* = **W. formòsa** Rehd. Lfts. 9–15: racemes about 25 cm. long; fls. about 2 cm. long; pedicels 1–1.5 cm. long; lower calyx-lobes long-acuminate: pod usually 1-seeded. Orig. 1905. All fls. of one raceme open at nearly the same time.

2. **W. sinénsis** Sweet. Chinese W. Lfts. 7–13, ovate-oblong to ovate-lanceolate, 5–8 cm. long, abruptly acuminate, usually broad-cuneate at base, ciliate, densely appressed-pubescent at first, glabrate at maturity: fls. blue-violet, about 2.5 cm. long, slightly fragrant, in rather dense racemes, 15–30 cm. long; pedicels 1–2 cm., rarely to 2.5 cm. long, short-villous; calyx pubescent; all fls. of one raceme opening at nearly the same time: pod 10–15 cm. long, densely velutinous, 1–3-seeded. Fl.v–vi. B.M.2083(c). B.R.650(c). L.B.773(c). B.C.5:t.119(h). (*W. chinensis* DC., *Kraunhia sinensis* Mak., *Glycine s.* Sims.) China. Intr. 1816. Zone (V).—Var. **alba** Lindl. Fls. white. I.H.5:t.166(c). Intr. 1846.—Like the preceding species an ornamental and popular vine, but tenderer.

3. **W. venústa** Rehd. & Wils. Young brts. pubescent: lfts. 9–13, ovate or elliptic-oblong to oblong-lanceolate, 6–10 cm. long, short-acuminate, rounded to subcordate, silky-pubescent on both sides, more densely beneath: fls. white, 2–2.5 cm. long, in pendulous pubescent racemes 10–15 cm. long; pedicels villous, usually 2.5–3 cm. long; 3 lower calyx-teeth subulate; standard auricled at base: pod 15–20 cm. long, densely velutinous, compressed. Fl.vi–vii. B.M.8811(c). (*W. brachybotrys* var. *alba* Wm. Mill.) Cult. in Japan; introd. before 1900. Zone V.—Var. **plèna** Rehd. & Wils. With double white fls. (*W. chinensis* var. *alba plena* Bean.) Cult. 1914.—Var. **violàcea** Rehd. Fls. violet. Japan. The wild form; not yet introd.

4. **W. frutéscens** DC. To 12 m. long: young brts. glabrous or nearly so: lfts. 9–15, elliptic-ovate to oblong or oblong-lanceolate, 2–5 cm. long, acute to obtusish or slightly acuminate, cuneate to rounded at base, glabrous above, sparingly appressed-pubescent beneath: fls. lilac-purple, 1.5–1.8 cm. long, in dense villous racemes 4–10 cm. long; pedicels villous; calyx appressed-pubescent, with very short teeth; standard auricled at base; wings with a slender and a short auricle on either side: pod 5–10 cm. long, compressed. Fl.vi–viii. B.M.2103(c). N.D.3:t.55(c). B.B.2:374. (*W. speciosa* Nutt., *Kraunhia fr.* Greene, *Bradleia fr.* Britt.) Va. to Fla. and Tex. Intr. 1724. Zone V.—Var. **nivea** Lescuyer. Fls. white (Var. *alba* Th. Moore.) Cult. 1854.

5. **W. macrostáchya** Nutt. Slender twiner to 8 m.; young brts. sparingly villous, soon glabrous: lfts. usually 9, ovate or elliptic-ovate to lance-elliptic, 3–7 cm. long, acuminate, rounded or subcordate at base, pubescent while young, later only sparingly so beneath: fls. lilac-purple in rather dense racemes

15–35 cm. long; pedicels glandular-pubescent; calyx with the lower teeth at least half as long as tube; standard not prominently auricled; wings with subulate spur about as long as claw: pod 7–12 cm. long, somewhat torulose. Fl.VI–VII. R.H.1862:12,t(c, as *W. fr. Bachousiana*). H.F.1855:t.19(c). F.S.11:t.1151(c). (*W. frutescens* var. *m.* Torr. & Gray, *W. fr.* var. *magnifica* Herincq, *Kraunhia m.* Small, *Bradleia m.* Small.) Mo. to Tenn. and Tex. Cult. 1855. Zone V or VI.—Var. **albo-lilácina** Rehd. With lighter colored lilac pinkish fls. (*W. frutescens* var. *a.* Dipp.)

6. **W. japónica** Sieb. & Zucc. Slender twining shrub: brts. glabrous: lfts. 9–13, ovate to ovate-lanceolate, 3–6 cm. long, obtusely acuminate, rounded or subcordate at base, glabrous and lustrous green: fls. white, about 1.2 cm. long, in slender axillary, often branching racemes 15–30 cm. long; calyx glabrous except the ciliate margin, 5 mm. long: pod 8–10 cm. long, glabrous, 6–7-seeded. Fl.VII–VIII. S.Z.1:t.43(c). D.L.3:698. S.H.2:f.46a-e,47a. (*Millettia j.* Gray, *Kraunhia j.* Taub.) Japan. Intr. 1878. Zone VII?—Less showy than the preceding species.

27. **ROBÍNIA** L. Deciduous trees or shrubs; winter-buds naked, small, hidden by the base of petiole before leaf-fall, terminal bud wanting; brts. usually with stipular spines: lvs. odd-pinnate; lfts. opposite, petioluled, stipellate: fls. white to pink or pale purple, slender-stalked in pendulous racemes; calyx campanulate, 5-toothed and slightly 2-lipped; standard suborbicular, reflexed; wings curved; keel incurved, its petals united below; upper stamen free or partly free: pod oblong or linear-oblong, flat, 2-valved, with several seeds. (After Jean Robin (1550–1629) and Vespasian R. (1579–1600), herbalists to the king of France.) About 20 species in N. Am. and Mex.—Ornamental trees and shrubs planted chiefly for their showy, often fragrant fls.

A. Brts. glabrous or pubescent.
B. Pod smooth: brts. glabrate: fls. white (pink in one var.); brts. with stipular spines, glabrous or glabrescent ..... 1. *R. Pseudoacacia*
BB. Pod hispid or glandular.
C. Brts. glabrous or minutely pubescent at first.
D. Brts. without stipular spines; peduncles glabrous ..... 2. *R. Boyntonii*
DD. Brts. with stipular spines; peduncles sparingly glandular-hairy: lfts. glabrous. 3. *R. Kelseyi*
CC. Brts. tomentose when young; peduncles and lfts. beneath grayish pubescent. 4. *R. Elliottii*
AA. Peduncles and brts. more or less hispid, glandular or viscid: pod hispid; fls. pink to purple.
B. Peduncles and brts. hispid or the latter sometimes glabrous: lfts. 7–15.
C. Lfts. suborbicular to oval, rounded at apex, glabrous ..... 5. *R. hispida*
CC. Lfts. elliptic-ovate to oblong-ovate, acute or acutish, slightly pubescent beneath. 6. *R. fertilis*
BB. Peduncles and brts. glandular-pubescent or viscid: lfts. 13–25.
C. Rachis of leaf pubescent, glandless, or nearly so: brs. with stipular spines. 7. *R. luxurians*
CC. Rachis of lf. glandlular or viscid.
D. Brts., peduncles and petioles puberulous and stipitate-glandular ... 8. *R. Hartwigii*
DD. Brts., peduncles and petioles glandular-viscid ..... 9. *R. viscosa*

1. **R. pseudoacacia** L. BLACK LOCUST. Tree to 25 m. with deeply furrowed brown bark; brts. glabrous or slightly pubescent at first: lfts. 7–19, elliptic or ovate, 2.5–4.5 cm. long, rounded or truncate and mucronate at apex, glabrous beneath or slightly pubescent when young: fls. white, very fragrant, 1.5–2 cm. long, in dense racemes 10–20 cm. long; standard with yellow spot at base: pod linear-oblong, 5–10 cm. long, smooth, 3–10-seeded. Fl.VI; fr.IX. H.W.3:104(h),t.58(c). S.S.3:t.112, 113. F.E.32:393(h). Gn.61:60(h). R.H. 1919:280,t(h). (False Acacia, Yellow Locust.) Pa. to Ga., w. to Iowa, Mo. and Okla.; naturalized elsewhere in N. Am. and also in Eu. Intr. about 1635. Zone V.—Var. **aûrea** Kirchn. Lvs. yellow.—Var. **purpúrea** Dipp. Young

lvs. purple.—Var. **coluteoïdes** Neum. Lfts. smaller, oblong-obovate, rounded at apex, cuneate; very floriferous. G.C.III.64:219. Orig. before 1857.—Var. **amorphifòlia** Link. Lfts. narrow, oblong. Orig. before 1820.—Var. **microphýlla** Loud. Lfts. small and narrow. G.W.2:219. (Var. *angusiifolia* Hort., var. *elegantissima* Hort.) Orig. before 1838.—Var. **crispa** DC. Lfts. with undulate and curled margin. Orig. before 1825.—Var. **bullàta** K. Koch. Lfts. crowded and bullate. Orig. before 1870.—Var. **lineàris** Kirchn. Lfts. linear: of spreading slender habit.—Var. **dissécta** Nichols. Lfts. linear or broader and dissected: of compact habit with short brs.—Var. **unifolíola** Talou. Lvs. with one large lft. or occasionally with 2–7. R.H.1860:630, 631. (Var. *monophylla* Carr.) Orig. 1858.—Var. **erécta** Rehd. Of columnar habit; lvs. with one or few large lfts. (Var. *monophylla fastigiata* Dieck.) Orig. about 1880.—Var. **depéndens** Rehd. Of pendulous habit; lvs. with one or few large lfts. (Var. *monophylla pendula* Dieck.) Orig. about 1880.—Var. **inérmis** DC. Brs. unarmed. (*R. spectabilis* Dum.-Cours., *R. inermis* Mirbel.) Orig. before 1804.—Var. **umbraculífera** DC. Brs. forming a dense subglobose head, unarmed; rarely flowering. M.G.18:630(h). (Var. *inermis* Hort., not DC.) Orig. before 1810.—Much used in Europe when grafted high for formal plantations and for small streets.—Var. **Rèhderi** Kirchn. A low subglobose form, usually grown on its own roots. G.W.2:217(h). Orig. 1842.—Var. **Bessoniàna** Kirchn. Similar to *f. umbraculifera*, but with slenderer brs. forming a less dense head of more ovoid outline. S.L.357(h). Orig. before 1864.—Var. **tortuòsa** DC. A slow-growing form with short twisted brs., sometimes pendulous at the tips. G.W.2:218(h). S.L.358(h). Orig. before 1810.—Var. **péndula** Loud. With somewhat pendulous brs. Orig. before 1820.—Var. **Ulriciàna** Reuter. With slenderer, more decidedly pendulous brs. Orig. before 1890.—Var. **pyramidàlis** Pepin. A columnar form with unarmed, erect brs. Gt.6:190(h). I.H.6:20(h). B.H.14:27(h). Gn.83:193(h). G.C.III.41:151(h). (Var. *fastigiata* Lem., not Neum.) Orig. before 1850.—Var. **strícta** Link. A pyramidal form with ascending brs. Orig. before 1820.—Var. **semperflòrens** Carr. Flowering during the whole summer. R.H.1875: 191. Orig. before 1875.—Var. **Decaisneàna** Carr. Fls. light rose-colored. R.H.1863:151,t(c). F.S.19:2027(c). Gn.9:36,t(c);34:174. Orig. before 1860.—Often planted as an ornamental tree chiefly for its fragrant fls., and the many garden forms for their various ornamental qualities; also used for shelter plantations and for afforestation purposes on dry, sandy soil.

R. p. × *hispida* = **R. Margarétta** Ashe. Shrub; lfts. pubescent beneath: fls. light pink, about 2 cm. long; rachis, pedicels and calyx pubescent and slightly glandular: pod roughened. S. C. Cult. 1920. Zone VI?—*R. p.* × *Kelseyi* = *R. Slavinii;* see under No. 3.—*R. p.* × *luxurians* = *R. Holdtii;* see under No. 7.—*R. p.* × *viscosa* = *R. ambigua;* see under No. 9.

2. **R. Boyntònii** Ashe. Shrub to 3 m.; brts. unarmed, glabrous or minutely pubescent: lfts. 7–13, elliptic to oblong, 1.5–2.5 cm. long, obtuse, soon glabrous; rachis slightly pubescent: fls. pink or rose-purple with white, about 2 cm. long, in rather loose, 8–10-fld. racemes: pod glandular-hispid. Fl.v–vi. (*R. hispida rosea* Hort.) N. C. and Tenn. to Ga. and Ala. Intr. 1914. Zone V.

3. **R. Kelseÿi** Hutchins. Shrub to 3 m.; brts. glabrous with slender prickles: lfts. 9–11, oblong-lanceolate, 2–3.5 cm. long, acute, glabrous: fls. rose-colored, 2–2.5 cm. long, in 5–8-fld. racemes; rachis and pedicels sparingly glandular-hairy; calyx finely pubescent, often with glandular hairs: pod oblong, 3.5–5 cm. long; densely covered with purple glandular hairs. Fl.v–vi. B.M.8213(c). Add.1:t.3(c). G.C.III.44:427(h);47:391;58:72;61:237(h). M.D.

25:101. R.H.1919:339(h). N. C. Intr. 1901. Zone V.—Very handsome and graceful shrub.

R. K. × *pseudoacacia* = **R. Slavînii** Rehd. Lfts. broader, acutish to obtuse: fls. rosy pink; rachis slightly villous, not glandular: pod roughened by minute tubercles. Orig. 1915.

4. **R. Elliŏttii** Ashe. Shrub to 1.5 m.; stems virgate with short brs. near summit; brts. with short spines, densely grayish pubescent when young: lfts. 11–15, elliptic, 1.5–2.5 cm. long, grayish pubescent beneath: fls. rose-purple or purple and white, 2–2.3 cm. long, in 5–10 fld. racemes; peduncles, pedicels and calyx grayish pubescent: pod linear, hispid. Fl.v–vi. (*R. hispida* var. *rosea* Ell.) N. C. to Ga. Intr. about 1901. Zone VI?

5. **R. hîspida** L. Shrub to 1 m., stoloniferous; stems, brts. and peduncles and often petioles hispid: lfts. 7–13, suborbicular to broad-oblong, 2–3.5 cm. long, obtuse and mucronulate, glabrous or nearly so: fls. rose-colored or pale purple, 2.5 cm. long, in 3–5-fld. hispid racemes: pod 5–8 cm. long, glandular-hispid, rarely developed. Fl.v–vi. Nederl. Fl. & Pom.t.49(c). F.R.2:57. B.C.5:2968. G.4:499. Va. and Ky. to Ga. and Ala. Intr. 1758. Zone V.—Var. **macrophýlla** DC. Brts. and petioles nearly destitute of bristles; lfts. and fls. somewhat larger. Gn. 77:268. G.M.45:512.—Handsome shrub with large rosy fls.; sometimes grafted high as standard.

A related species is **R. longîloba** Ashe. Shrub to 1 m.: brts. pubescent and hispid: fls. pale pink; rachis hispid; calyx glandular-hispid; standard narrow. Ga. Cult. 1908. Zone VI?

6. **R. fértilis** Ashe. Shrub to 2 m., stoloniferous; stems, brts., peduncles and petioles hispid; lfts. 9–15, elliptic to oblong-ovate or oblong, 2–5 cm. long, acute to obtusish, mucronate, slightly pubescent beneath when young: fls. rosy-pink, 2–2.5 cm. long; pedicels 5–8 mm. long, like the calyx densely hispid; calyx-lobes lanceolate, about half as long as tube: pod 5–7 cm. long, densely hispid. Fl.vi. N. C. to Ga. Intr. before 1900. Zone V.—Similar to the preceding species, but taller, with smaller fls. and freely fruiting.

7. **R. luxùrians** Schneid. Shrub or small tree, to 10 m.; brts. with stipular spines, glandular-pubescent when young: lfts. 15–21, elliptic-oblong, 2–3.5 cm. long, rounded and mucronate, silky-pubescent beneath, at least while young; petioles villous: fls. pale rose-colored or nearly white, about 2 cm. long, in dense, many-fld. racemes; peduncles and pedicels glandular-pubescent: pod 6–10 cm. long, glandular-hispid. Fl.vi–viii. B.M.7726(c). S.S.3:t.114. Gt.41:t.1385(c). R.H.1895:112,t(c). S.L.356(h). For. & Irrig.13:89(h). (*R. neo-mexicana* var. *l.* Dieck, *R. neo-mexicana* Auth., not Gray.) Colo. to N. Mex., Ariz. and Utah. Intr. 1881. Zone V.

R. l. × *pseudoacacia* = **R. Holdtii** Beissn. Tree: lfts. 3.5–5 cm. long, rather dark and firm: fls. light pink to rose-colored, in less dense racemes: pod with scattered stalked glands. Orig. about 1890.—Var. **britzénsis** Spaeth. Fls. whitish. Orig. before 1900.—Also *R. coloradensis* Dode belongs here.—**R. neo-mexicàna** Gray is similar to *R. luxurians*, but has smooth pods. N. Mex. Not in cult. and probably not hardy.

8. **R. Hartwìgii** Koehne. Shrub to 4 m. Brts., petioles and peduncle densely stipitate-glandular and puberulous: lfts. 13–23, elliptic to lanceolate, 2–3.5 cm. long, mucronate, loosely pubescent above and grayish pubescent beneath: fls. whitish to rosy purple, about 2 cm. long, in rather dense racemes without the peduncle 5–7 cm. long; calyx pubescent and stipitate-glandular; pod oblong, 5–9 cm. long, glandular-bristly and pubescent. Fl.vi. N. C. to Ala. Cult. 1904. Zone V.

9. **R. viscòsa** Vent. Tree to 12 m.; the dark red-brown brts. and usually the petioles and peduncles densely glandular-viscid; stipular spines small or

wanting: lfts. 13–25, ovate, 2.5–4 cm. long, obtuse or acute, broad-cuneate at base, pubescent beneath or sometimes glabrous: fls. about 2 cm. long, pink with yellow blotch on standard, in 6–16-fld. racemes 5–8 cm. long; calyx dark red, pubescent: pod narrow-oblong, 5–8 cm. long, sparingly glandular-hispid. Fl.v–vi. B.M.560(c). R.I.22:t.143i–ii(c). S.S.3:t.115. B.S.2:413. (*R. glutinosa* Sims.) N. C. to Ala. Intr. 1791. Zone V or VI.

R. v. × *pseudoacacia* = **R. ambigua** Poir. Tree; brts. only slightly viscid, with small spines; lfts. 13–21: fls. light pink. (*R. dubia* Foucault, *R. intermedia* Soul.-Bod.) R.I.22:t.144(c). Gn.89:717(h). Orig. before 1812.—Var. **bella-rósea** Rehd. Brts. more viscid: fls. larger and of deeper color. (*R. bella-rosea* Nichols., *R. viscosa* var. *b.* Voss, *R. pseudo-acacia* var. *b.* Cowell.) Orig. before 1880.

28. **COLÙTEA** L. Bladder-Senna. Deciduous unarmed or rarely spiny shrubs; winter-buds small, globose-ovoid, with 2–4 outer scales; brs. with fibrous or flaky bark: lvs. odd-pinnate, with rather small entire lfts.; stipules small: fls. yellow to brownish red, in axillary long-peduncled few-fld. racemes; calyx campanulate, with 5 subequal teeth or the two upper ones shorter; standards suborbicular with two swellings above the claw; petals of keel with partly connate claws; upper stamen free; ovary stipitate; style incurved, bearded near apex, with the stigma below the apex: pod inflated, with papery walls, indehiscent, sometimes open at apex. (*Koloutea*, ancient Greek name of a leguminous tree.) About 10 species from S. Eu. to W. Himal.

A. Pod closed at apex: lfts. 1.5–3 cm. long.
  B. Fls. yellow.
    C. Wings as long or shorter than keel ..... 1. *C. arborescens*
    CC. Wings longer than keel ..... 2. *C. cilicica*
  BB. Fls. more or less reddish or brownish ..... 3. *C. media*
AA. Pod and ovary open at apex: lfts. usually small, thickish with obscure veins.
  B. Fls. yellow ..... 4. *C. gracilis*
  BB. Fls. reddish orange to orange-brown ..... 5. *C. orientalis*

1. **C. arboréscens** L. Shrub to 4 m.; young brts. pubescent: lfts. 9–13, elliptic to obovate, 1.5–3 cm. long, usually emarginate and mucronate, bright green above, slightly pubescent and paler beneath, membranous, with fairly distinct venation: fls. about 2 cm. long, bright yellow; standard with red markings, in 6–8-fld. racemes; peduncle 2–4 cm. long; pedicels about 1 cm. long; ovary thinly pubescent: fr. glabrescent, greenish or slightly reddish near base, 6–8 cm. long. Fl.v–vii; fr.vii–x. B.M.81(c). S.O.2:t.117(c). R.I.22:t.141(c). E.N.III.3:282. B.C.2:834. S. Eu., N. Afr. Intr. 1570. Zone V.—Var. **crispa** Kirchn. Slow growing form, the lvs. with undulate margin.—Var. **bullàta** Rehd. Dwarf and compact: lfts. 5–7, obovate or nearly orbicular and somewhat bullate, 8–15 mm. long.

C. a. × *orientalis* = *C. media;* see No. 3.

A closely related species is **C. brevialàta** Lge. Lower: lfts. usually 11, smaller: fls. 1.2–1.5 cm. long, in 2–6-fld. racemes; wings much shorter than keel and standard. S.H.2:f.53k-m,54a. S. France. Cult. 1860.

2. **C. cilícica** Boiss. Shrub similar to the preceding: lfts. usually 11, oval or obovate, 1–2 cm. long, rounded or truncate and mucronate at apex, slightly hairy beneath, bluish green: fls. yellow, in 3–5-fld. racemes; wings longer than keel. Fl.vi–vii. G.C.III.16:155. S.H.2:f.54h-k,55a-l. (*C. longialata* Koehne, *C. melanocalyx* Hort.) Asia Minor. Cult. 1892. Zone V.

Related species are: **C. melanócalyx** Boiss. Lfts. 7–11, broad-elliptic, emarginate, more pubescent beneath: fls. smaller; calyx densely dark brown-pubescent, with broader triangular teeth; wings slightly longer than keel; pod about 5 cm. long. S.H.2:f.54l-m,55f-i. Asia Minor. Cult. 1905. Zone V or VI.—**C. ístria** Mill. Shrub to 2 m.: lfts. 9–13, sometimes to 19, about 1 cm. long: fls. orange-yellow, about 2 cm. long, in 1–4-fld. racemes. S.O.2:t.120(c). S.H.2:f.53e-i,54p. (*C. halepica* Lam., *C. Pocockii* Ait.) Asia Minor. Intr. 1752. Zone VII?

3.×**C. mèdia** Willd. (*C. arborescens* × *orientalis*). Similar to *C. arborescens:* lfts., 11–13, obovate, 1.5–2.5 cm. long, pubescent beneath, bluish green: fls. brownish red or deep orange, 1.5 cm. long; pod 6–7 cm. long, usually closed at apex, tinged purple. L.D.8:524(c). S.O.2:t.118(c). R.I.22:t.140(c). Orig. before 1790. Zone V. Often cult. as *C. orientalis.*

4. **C. grâcilis** Freyn & Sint. Shrub to 3 m.; young brts. pubescent: lfts. 7–9, obovate, 4–8 mm. long, appressed-pubescent beneath: fls. yellow, 1.2–1.5 cm. long, in 1–4-fld. racemes; wing about as long as keel; keel not rostrate; calyx pubescent with dark hairs; ovary pubescent: pod 3–4 cm. long. S.H.f. 56i-k,57a-e. Transcaspia. Cult. 1920. Zone VI?

Related species are: **C. pérsica** Boiss. Young brts. glabrous: lfts. 7–13, obovate or broad-obovate, 8–15 mm. long, nearly glabrous beneath, thickish: fls. 2 cm. long; calyx sparingly pubescent; ovary usually glabrous. S.H.f.55o-q,56g-h. Kurdistan, Persia. Intr. ?—**C. nepalénsis** Hook. Young brts. nearly glabrous: lfts. 9–13, oval, 6–12 mm. long, rounded at apex; pubescent above: fls. about 2 cm. long, in 3–4-fld. drooping racemes; keel rostrate. B.M.2622(c). B.R.1727(c). Afghan. to Nepal. Cult. 1822. Zone VII?

5. **C. orientàlis** Mill. Shrub to 2 m.; young brts. pubescent: lfts. 7–11, broad-obovate, 8–15 mm. long, rounded or emarginate at apex, cuneate, glabrous above, slightly pubescent beneath when young, glaucous, thickish: fls. reddish brown, 1.5 cm. long, in 2–5-fld. racemes; standard with yellow blotch; wings shorter than keel; calyx slightly pubescent: pod 3–3.5 cm. long, usually suffused with violet-purple. Fl.VI–IX. (*C. cruenta* Ait.) S.O.2:t.119(c). R.I.22:t.142(c). S.L.156(h). Cauc. to Turkest. Intr. 1710. Zone V. or VI.—Conspicuous by its pale glaucous foliage.

C. o. × *arborescens* = *C. media;* see No. 3.

29. **HALIMODÉNDRON** Fisch. Deciduous shrub; winter-buds ovoid with several outer scales: lvs. abruptly pinnate, with 2 or 4 sessile lfts. and a persistent usually spinescent rachis; stipules subulate, spinescent: fls. pale purple or lilac, in lateral slender-stalked, 2–3-fld. racemes; calyx cup-shaped with 5 short teeth; petals of nearly equal length; standard orbicular, with reflexed sides; keel obtuse, curved; upper stamen free; ovary stipitate, with many ovules; style curved with small terminal stigma: pod obovoid to oblong, inflated, with leathery thick walls, abruptly short-rostrate. (Greek *halimos* maritime, and *dendron,* tree; referring to its habitat on saline soil.) One species.

H. halodéndron Voss. SALT-TREE. Shrub to 2 m., with spreading spiny brs. silky pubescent when young: lfts. oblanceolate, 1.5–3.5 cm. long, rounded or mucronate at apex, cuneate, grayish or bluish green, minutely silky or sometimes glabrous: fls. 1.5–1.8 cm. long; calyx pubescent, persistent: fr. 1.5–2.5 cm. long, brownish yellow. Fl.VI–VII. B.M.1016(c). G.O.t.69(c). S.O.1:t.35(c). S.L.219(h). (*H. argenteum* Fisch.) Transcauc. to Turkest. and Altai. Intr. 1779. Zone V.—Var. **purpúreum** Schneid. Fls. rosy purple. (*H. speciosum* Carr.) R.H.1876:30,t(c). Orig. before 1876.—Ornamental shrub, very handsome and graceful when in bloom.

30. **CARAGÀNA** Lam. Deciduous shrubs; winter-buds ovoid, with several outer scales; lvs. often fascicled, abruptly pinnate, with 2–18 small entire lfts.; rachis often persistent and spiny; stipules small, deciduous or persistent and spiny: fls. yellow, rarely whitish or pinkish, solitary or fascicled; calyx tubular or campanulate with nearly equal teeth, the 2 upper usually smaller; standard upright, with recurved sides, like the wings with long claws; keel straight; upper stamen free; ovary subsessile, rarely stipitate; style straight or slightly

curved, with small terminal stigma: pod linear, terete or inflated, usually pointed; seed obliquely ellipsoid or subglobose. (Caragan, the Mongolian name of the plant.) More than 50 species from s. Russia to China and Manchuria and Himal. Monograph by Komarov in Act. Hort. Petrop. 29:179–388(1908) with 16 plates.—Planted as ornamental shrubs chiefly for their profusely produced bright yellow fls.

A. Lfts. 6–18, or partly 4 on same plant.
  B. Rachis of lf. deciduous;
    C. Lfts. 12–18, 3–8 mm. long.....1. *C. microphylla*
  CC. Lfts. 8–14.
    D. Spiny stipules much shorter than petioles; lfts. 1–2.5 cm. long; rachis 3.5–8 cm. long.....2. *C. arborescens*
    DD. Spiny stipules usually about half as long as petiole; rachis 1–3 cm. long; lfts. 6–12 mm. long.....3. *C. decorticans*
  BB. Rachis of lf. persistent, spiny.
    C. Fls. 3–4 on a common peduncle; lfts. 10–14; stipules spinescent.....4. *C. brevispina*
  CC. Fls. solitary.
    D. Stipules membranous: fls. whitish or pale yellow; pedicels articulate at base.
      E. Lfts. 8–18 mm. long; auricles of wing as long as claw: brs. very thick, covered with crowded lf.-bases and spines.....5. *C. jubata*
      EE. Lfts. 4–6 mm. long; auricles of wings much shorter than claw; brs. slenderer. 6. *C. Gerardiana*
    DD. Stipules spinescent: fls. bright yellow; wings with short or without auricles; pedicels articulate near the middle.
      E. Lvs. pinnate with 4–6 lfts.; spiny rachis short.....7. *C. Maximowicziana*
      EE. Lvs. dimorphic, pinnate and digitate on same branch; spiny rachis 2–6 cm. long. 8. *C. spinosa*

AA. Lfts. always 2 or 4.
  B. Lfts. in 2 remote pairs, obovate; stipules spinescent.....9. *C. chamlagu*
  BB. Lfts. 2–4, close together, digitate.
    C. Lvs. stalked; lfts. obovate.....10. *C. frutex*
    CC. Lvs. subsessile; lfts. linear-elliptic to linear-lanceolate.....11. *C. pygmaea*

1. **C. microphýlla** Lam. Shrub to 3 m., with long spreading brs.; young brts. finely silky: lfts. 12–18, oval to obovate, 3–8 mm. long, rounded or emarginate at apex, silky-pubescent at first, grayish green: fls. 1–2, yellow, about 2 cm. long; pedicels 1.5–2.5 cm. long; calyx finely pubescent, tubular with short teeth: pod 2.5–3 cm. long. Fl.v–vi. L.B.1064(c). Gt.10:t.366. B.C.2:660. (*C. altagana* Poir.) Siberia, N. China. Intr. 1789. Zone V.—Var. **megalántha** Schneid. Lfts. orbicular-obovate, to 1.2 cm. long, or elliptic and to 1.5 cm. long, less pubescent, bright green: fls. about 3 cm. long, pod 3–4 cm. long.—Graceful shrub.

C. m. × *arborescens* = *C. sophoraefolia;* see under No. 2.

2. **C. arboréscens** Lam. Pea-tree. Shrub or small tree to 6 m., of upright habit; young brts pubescent: lfts. 8–12, obovate to elliptic-oblong, 1–2.5 cm. long, rounded at apex and mucronate, pubescent when young, later glabrescent, bright green: fls. 1–4, fascicled, yellow, 1.5–2 cm. long, on pedicels 1.5–2.5 cm. long; calyx with very short teeth: pod 3.5–5 cm. long. Fl.v. G.O.t.67(c). S.O.1:t.33(c). N.D.2:t.19(c). (*C. Caragana* Karst.) Siberia, Manch. Intr. 1752. Zone I or II.—Var. **Lorbérgii** Koehne. Lfts. linear, 2–2.5 cm. long; standard and wings narrower. Orig. before 1906. Remarkable and graceful form.—Var. **péndula** Carr. With stiffly pendent brs.; usually grafted high. M.G.12:425(h). Orig. 1854.—Var. **nàna** Jaeg. Dwarf stunted shrub with contorted brs. Orig. before 1875.—The typical form is much grown for hedges and shelter plantations in the N. W.

C. a. × *microphylla* = **C. sophoraefòlia** Bess. Lfts. usually 12, elliptic to oblong, 8–15 mm. long, cuneate, mucronate: pods about 2 cm. long. (*C. cuncifolia* Dipp., *C. arborescens* var. *c.* Bean.) Orig. before 1816.

A closely related species is **C. fruticòsa** Bess. Shrub to 2 m.: lfts. 8–14, oblong to obovate, 1.5–2.5 cm. long, cuneate at base, rounded or acute at apex; stipules herbaceous or slightly spiny: fls. solitary, larger, on longer puberulous peduncles; calyx puberulous, with very short teeth: pod 2–3 cm. long; seeds brown. (*C. arborescens* var. *f.* Dipp., *C. Redowskii* Fisch.) Amurl., Korea. Cult. 1817.

3. **C. decórticans** Hemsl. Shrub or small tree; bark greenish; stipules spiny, brown, 3–8 mm. long: rachis spiny-pointed; lfts. 6–12, elliptic to obovate, 6–15 mm. long, spiny-mucronate, appressed-puberulous, reticulate: fls. 2.5 cm. long, on slender pedicels to 2 cm. long; calyx campanulate, with triangular spiny-aristate teeth; wings with a spur-like auricle: pod 3–4 cm. long. Fl.VI. H.I.1725. Act. Hort. Petrop.29:t.14A. S.H.2:f.59o-q[1],62a. Afghan. Intr. 1879. Zone V.

A related species is **C. Boisii** Schneid. Shrub to 2 m.; stipules spiny, to 1 cm. long: lfts. 10–12, obovate to narrow-obovate, 4–18 mm. long, dark green above, light grayish green and slightly pubescent beneath, of firm texture: fls. solitary; calyx-teeth not spiny; ovary pubescent. Act. Petrop.29:t.15B. V.F.57. S.L.131(h). (*C. microphylla* var. *crasse-aculeata* Bois.) W. China. Intr. 1895. Zone V.

4. **C. brevispìna** Royle. Shrub to 2.5 m.; young brts. puberulous: lfts. 10–14, elliptic-oblong to oblong, 8–25 mm. long, rounded at apex, silky when young, nearly glabrous at maturity; rachis 3–7 cm. long, persistent, spiny; stipules spiny, about 6 mm. long: fls. yellow, nearly 2 cm. long, 2–4 on a common peduncle; pedicels with long subulate bractlets; calyx villous, with deltoid, long-acuminate teeth: pod about 5 cm. long, villous inside and slightly so outside. Fl.VI. P.F.2:148. (*C. triflora* Lindl.) N. W. Himal. Intr. before 1850. Zone VII?

A related species is **C. sukiénsis** Schneid. Lfts. 10–14, linear-lanceolate, about 8 mm. long, acute at ends, with prominent lateral nerves and long silky hairs beneath; rachis about 3 cm. long, spiny; stipules membranous: fls. solitary, about 2.5 cm. long; peduncles 3–6 mm. long; pod about 1.5 cm. long, slightly pubescent. N. W. Himal. Intr. 1919. Zone ?

5. **C. jubàta** Poir. Shrub to 1 or occasionally 5 m. tall, with few upright, sparingly branched stems; brs. thick, densely covered with crowded spines and stipules and shaggy tomentum; stipules scarious with setaceous apex: lfts. 8–14, oblong, 6–18 mm. long, villous, with narrow-triangular teeth; ovary villous: pod about 2 cm. long, hairy. Fl.IV–V. Gt.10:t.331. F.S.19:t. 2013(c). L.B.522(c). S.L.132(h). E. Siberia to W.China and Turkest. Intr. 1796. Zone I or II.—Grown for its odd and curious appearance.

6. **C. Gerardiàna** Royle. Compact, much-branched shrub to 1 m.; brts. densely pubescent when young, close-jointed; stipules scarious; rachis spiny to 5 cm. long: lfts. 8–12, obovate to oblong-oblanceolate, 5–10 mm. long, mucronate, silky-pubescent: fls. solitary, 2–2.5 cm. long, pale yellow, short-stalked; calyx cylindric, about 1 cm. long, pubescent, with deltoid, cuspidate lobes; wings with short auricle: pod villous, 2–3 cm. long. Fl.IV–V. Jacquemont, Voy. Bot. t.43. Act. Hort. Petrop. 29:t.13B. S.L.132(h). (*C. spinosissima* Benth.) N. W. Himal. Intr. before 1870. Zone VI.—Remarkable for its long spines and the thick tomentum of its brts.

A related species is **C. Franchetiàna** Komar. Spines stout, remote: lfts. 8–10, glabrescent above; pedicels with 3 bractlets; calyx with triangular-lanceolate lobes nearly as long as tube; wings with a slender auricle about as long as claw and on the upper side with a slender tooth: pod pubescent, 3–4 cm. long. Act. Hort. Petr. 29:t.13A. S. W. China. Intr. 1914. Zone VI?

7. **C. Maximowicziàna** Komar. Densely branched spreading shrub to 1.5 m. with slender red-brown glabrous or at first slightly pubescent brts.: stipules deltoid, spinescent; rachis spiny, short; lfts. 4–6, oblong-lanceolate, 5–10 mm. long, spinulose-mucronate, bright green: fls. short-stalked, yellow, 2–2.5 cm. long; calyx cylindric, glabrous, with very short teeth; standard narrow-obovate; wings without auricle; ovary pilose only on ventral suture. Fl.V–VI. Act. Petrop. 29:t.11B. W. China. Intr. 1910. Zone V.—Handsome shrub with bright green foliage and fairly large fls.

A related species is **C. tragacanthoìdes** Poir. Low upright or prostrate shrub,

with pubescent spiny brs.; stipules short, spinescent; rachis spiny, to 3 cm. long: lfts. 4–10, obovate to oblanceolate, 8–15 mm. long, cuneate, appressed-pubescent: fls. 2.5–3 cm. long; calyx broad-cylindric or campanulate, pubescent, with triangular spinulose teeth; wings auriculate: pod 2.5–3 cm. long, twice as long as calyx, shaggy pubescent. Pallas, Spec. Astrag.t.86. S.H.2:f.62f,63a-b. N. W. China to Altai and N. W. Him. Intr. 1816. Zone V.

8. **C. spinòsa** DC. Shrub to 2 m. or sometimes prostrate, with long spiny brs. pubescent when young; stipules scarious or sometimes with spinescent apex; rachis silky when young, spiny, 2–5 cm. long, spreading: lfts. 4–8, oblong-obovate to linear-lanceolate, 8–15 mm. long, rounded or short acuminate, cuneate, slightly silky when young, later glabrate; lvs. of spurs with 4 digitate lfts.: fls. usually solitary, short-stalked, 2–2.5 cm. long; calyx cylindric, glabrescent, with short deltoid teeth; wings linear-oblong, scarcely auricled: pod linear-oblong, about 2 cm. long, glabrous. Fl.v–vi. N.D.2:t. 20(c). S.O.1:t.36(c). S.H.2:f.60a,63f-p. (*C. ferox* Lam., *C. spinosissima* Lam., *C. tragacanthoides* Hort., partly.) Siberia. Intr. 1775. Zone V.—Var. **foliòsa** Komar. Lfts. crowded, longer; rachis partly persistent, partly deciduous.

9. **C. chamlàgu** Lam. Bushy shrub to 1.5 m., with upright and spreading brs.: brts. angled, slender, glabrate; stipules usually spinescent, to 8 mm. long; rachis persistent, spiny or caducous: lfts. 4, obovate to cuneate-obovate, 1–3.5 cm. long, rounded or emarginate, dark green and lustrous above, glabrous, chartaceous at maturity and finely reticulate: fls. solitary, 2.5–3 cm. long, reddish yellow; pedicels about 1 cm. long, articulate about the middle; calyx campanulate; standard narrow-obovate; pod 3–3.5 cm. long, slightly compressed, glabrous. Fl. v–vi. N.D.2:t.21(c). G.O.t.30(c). Act. Hort. Petrop. 29:t.5B. S.L.133(h). N. China. Intr. 1773. Zone V.

10. **C. frùtex** K. Koch. Upright shrub to 3 m., glabrous; brts. slender, yellowish: lfts. 4, obovate to oblong-obovate, 1.5–2.5 cm. long, rounded or emarginate, cuneate, membranous, dull green: fls. 1–3, bright yellow, 2–2.5 cm. long, on pedicels nearly as long as fls., articulate about the middle; calyx campanulate: pod cylindric, 3–3.5 cm. long, glabrous. Fl.v–vi. S.O. 1:t.34(c). S.B.3:t.227(c). B.C.2:660. (*C. frutescens* DC.) S. Russia to Turkest. and Siber. Intr. 1752. Zone V.—Var. **macrántha** Rehd. Lfts. larger, to 2.8 cm. long; fls. 2.5–3 cm. long; rachis caducous; calyx broader. S.H.2:f.64w-y. (*C. fr.* var. *grandiflora* Schneid.)—Var. **latifòlia** Schneid. Lfts. to 3.2 cm. long and to 1.4 cm. broad; rachis caducous. Gt.10:t.348. S.H.2:f.64t-v. (Var. *obtusifolia* Hort.)

11. **C. pygmaèa** DC. Upright or sometimes prostrate shrub, to 1 m., with slender virgate brs., glabrous: stipules spiny, short: rachis deciduous or persistent, 5–8 mm. long: lvs. subsessile; lfts., 4, linear-oblanceolate, 8–15 mm. long, acuminate and spiny pointed: fls. solitary, about 2 cm. long; yellow, on stalks about 1 cm. long and articulate above the middle; calyx narrow-campanulate, with triangular teeth; auricle of wings very short: pod 2–3 cm. long, cylindric, glabrous. Fl.v–vi. B.R.1021(c). S.O.1:t.37(c). S.L.62(h). N. W. China and Siberia. Intr. 1751. Zone V.

Closely related species are: **C. aurantíaca** Koehne. Very similar to the preceding; rachis persistent, about 5 mm. long; fls. 1.5–2 cm. long, orange-yellow; calyx slightly broader than long; auricle of wing at least half as long as claw. B.S.1:289. (*C. arenaria* Dipp., *C. pygmaea aurantiaca erecta* Hort.) Siberia to Afghan. and Turkest. Cult. 1830, again intr. 1887. Zone V.—**C. grandiflòra** DC. Shrub to 1 m.; rachis persistent, 4–7 mm. long; lfts. oblong-obovate, rounded or short-acuminate and spiny-pointed, glabrous or puberulous: fls. 2.5–2.8 cm. long, on pedicels articulate below the middle; calyx tubular, saccate at base. S.H.2:t.64e-h. (*C. pygmaea* var. *g.* K. Koch.) S. Russia and Cauc. to Turkest. and Song. Intr. 1823. Zone V?

31. **CALÓPHACA** Fisch. Deciduous low shrubs or herbs: lvs. odd-pinnate with small entire lfts.; stipules scarious (in our species) or herbaceous, adnate to the petiole: fls. yellow and racemose (in our species) or violet and 1–3; calyx tubular with 5 nearly equal teeth or the 2 upper somewhat connate; standard upright, with reflexed margin and slightly auriculate base; wings oblong, free, as long as the obtuse or emarginate keel; upper stamen free; ovary sessile, many-ovuled: pod cylindric. (Greek *kalos*, beautiful, and *phaca*, lentil.) About 10 species from S. Russia to India.

C. wolgàrica Fisch. Shrub to 1 m., often procumbent; young brts. glandular-pubescent: lvs. 5–8 cm. long; lfts. 11–17, orbicular to broad-elliptic, 8–15 mm. long, rounded at ends, mucronate, pubescent beneath: fls. bright yellow, 2–2.3 cm. long, in 4–6-fld. axillary peduncled and glandular-pubescent racemes; pedicels about 3 mm. long; calyx-teeth lanceolate: pod 2–3 cm. long, glandular-pubescent, 1–2-seeded. Fl.VI–VII. B.C.2:636. S. Russia to Turkest. Intr. 1756.—Handsome plant for sunny positions in well drained soil, sometimes grafted high on Laburnum.

A closely related species is **C. grandiflòra** Regel. Lfts. 17–25: fls. 2.5–2.8 cm. long, in 10–16-fld.racemes: pod to 5 cm. long, less pubescent. Gt.35:t.1231(c). Turkest. Intr. about 1880. Zone V.

32. **ASTRÁGALUS** L. Herbs or small shrubs: lvs. odd-pinnate or abruptly pinnate, rarely digitate, the shrubby species often with persistent spiny rachis; stipules free, adnate to petiole or connate and opposite to the leaf: fls. whitish, yellowish, purple or violet, in axillary racemes or heads; calyx tubular to campanulate with subequal teeth; standard upright; wings oblong, adhering to the obtuse or acutish keel, their claws often adnate to the staminal tube; upper stamen usually free: ovary sessile or stipitate, usually many-ovuled; style slender, straight or slightly curved with terminal small stigma: pod usually more or less completely 2-celled by a longitudinal septum, or inflated and not or incompletely 2-celled. (Latin name of some species of this genus, originally from the Greek, meaning ankle-bone.) About 1500 species in the n. hemisphere, chiefly in the temp. regions; our species are low shrubs or subshrubs with the rachis of the abruptly pinnate lvs. persistent and spiny.—Adapted for sunny rockeries and well drained positions; some species yield tragacanth, a gum used in medicine.

A. tragacántha L. Shrub to 0.3 m.; brts. whitish tomentose and spiny; stipules small, adnate at base to petiole; lvs. very crowded: lfts. 12–22, oblong, 4–7 mm. long, obtuse or truncate, silky-pubescent: fls. white, about 1.5 cm. long, in axillary 3–8-fld. heads; calyx tubular, villous, with short lanceolate, obtuse teeth: pod oblong, about 1 cm. long, exceeding the calyx, 2-celled, 4-seeded. Fl.V–VI. S.L.62(h). (*A. massiliensis* Lam.) S. Eu. Cult. 1783. Zone VI or VII.

Another species of the sect. CERCIDOTHRIX which has 2-armed hairs is **C. angustifòlius** Lam. Low dense spiny shrub: lfts. 18–20, oblong to linear-oblong, about 5 mm. long, appressed-pubescent, fls. white, keel violet at apex, in few-fld. heads; calyx campanulate, with 2 bracts at base; pod longer than calyx, appressed-pubescent. R.I.22:t.166(c). S.F.8:t.734(c). S.L.107(h). Greece, Asia Minor. Cult. 1910.—The following 2 species have simple hairs and small 1-seeded pods, not exceeding the calyx; the first belongs to the sect. CALYCOPHYSA, the second to sect. TRAGACANTHA: **A. aristàtus** L'Hérit. Procumbent subshrub, spiny; stipules connate, sheathing: lfts. 12–20, oblong-obovate to linear-oblong, about 8 mm. long, loosely villous: fls. white to pinkish, in 3–8-fld. heads; calyx densely white-villous. R.I.22:t.166(c). S.F.735(c). S.L.106(h). S.H.2:f.64a-d. (*A. sempervirens* Lam.) S. Eu. Cult. 1914.—**A. drusòrum** Boiss. Upright shrub to 0.5 m., spiny; lfts. 16–20 ovate-oblong, 6–8 mm. long, obtuse and spiny-mucronate,

sparingly appressed-pubescent: fls. in 2–3-fld. axillary heads forming ovate-oblong to cylindric spikes to 7 cm. long. S.L.107(h). Asia Minor. Cult. 1910.

Tribe 7. HEDYSAREAE Taub. Lvs. 3-foliolate or pinnate: upper stamen usually free: pod not dehiscent, usually jointed and separating at maturity into 1-seeded segments, or 1-seeded.

33. **CORONÍLLA** L. Herbs or small deciduous or half-evergreen shrubs, usually glabrous: lvs. odd-pinnate; lfts. opposite, entire; stipules small or foliaceous: fls. yellow (in our species), white or pink, in axillary peduncled umbels; calyx campanulate, with short subequal teeth; petals with rather long claws; standard suborbicular; keel incurved, rostrate; ovary sessile, many-ovuled; style incurved, with small capitate stigma; pod terete or 4-angled, separating into oblong or cylindric segments. (Diminutive of Latin *corona*, crown; referring to the arrangement of the fls.) About 20 species in Eu. and the Mediterr. region, mostly herbaceous.

C. Èmerus L. SCORPION SENNA. Shrub to 3 m., usually lower; brts., green, striate, pubescent only when young; lfts. 7–9, obovate, 1–2, rarely 3 cm. long, rounded or truncate at apex, cuneate, grayish green, slightly pubescent when young: fls. yellow, 1.5–2 cm. long, 2–3 on a slender stalk 2–5 cm. long; standard with a reddish brown line on back; pod about 5 cm. long, slender, terete. Fl.v–x. B.M.445(c). R.I.22:t.182(c). B.C.2:855. S.H. 2:f.66a-k. Gng.5:36. C. and S. Eu. Intr. before 1600. Zone V.

A closely related species is **C. emeroìdes** Boiss. Lfts. usually 7, sometimes 5: fls. 1.5–1.8 cm. long, 4–7 in each umbel: pod 5–7 cm. long. R.I.22:t.182(c). S.H.2: f.66l. (*C. Emerus* var. *austriaca* Heimerl, var. *e.* Wohlf.) S. E. Eu. Cult. 1880. Zone VI.—Ornamental shrubs valued for their continuous blooming all summer.—*C. juncea* L., *C. glauca* L. and *C. valentina* L. are in cult., but probably not hardy within our area.

34. **HEDÝSARUM** L. Perennial herbs or shrubs: lvs. odd-pinnate; lfts. opposite, without stipels; stipules scarious: fls. white to purple in axillary racemes; calyx campanulate, with subequal teeth; standard obovate, scarcely clawed; wings shorter than standard, clawed, auriculate; keel truncate at apex, usually straight; upper stamen free; ovary sessile; style filiform, incurved at apex, with small terminal stigma: pod flattened, jointed, separating at maturity into suborbicular or square segments. (Ancient Greek name.) About 70 species, mostly herbaceous, in temp. regions of the n. hemisphere.

H. multíjugum Maxim. Shrub to 1.5 m., of sparse habit; young brts. finely pubescent, zigzag in growth: lfts. 21–41, ovate or obovate to oblong, 6–15 mm. long, obtuse or retuse, appressed pubescent beneath like the rachis: fls. rosy magenta, 1.5–2 cm. long, short-pediceled, in upright long-stalked racemes 15–25 cm. long; calyx split on one side; standard greenish yellow at base: pod 1–2-seeded, tuberculate, its segments suborbicular. Fl. VI–IX. Mongolia.—Only the following var. in cult.—Var. **apiculàtum** Sprague. Lfts. 17–27, apiculate, glabrous above. Fl.VI–IX. B.M.8091(c). Gt.31:t. 1122(c). Gn.53:408,t(c). G.C.III.18:8(h),9. S.L.221(h). Intr. about 1880. Zone V.—Graceful shrub valuable for its late fls.

35. **ALHÀGI** Desv. Deciduous spiny shrubs: lvs. small, simple, entire; stipules small: fls. red, in axillary few-fld. racemes with rigid spiny rachis, toward the end of brs.; calyx campanulate, with 5 subequal teeth; standard obovate, as long as the curved wings and the obtuse incurved keel; upper stamen free; style slender, incurved, with small terminal stigma: pod linear, torulose, not separating into segments. (Its Mauretanian name.) Three species from Greece and Egypt to the foot of the Himal.

A. camelòrum Fisch. Low spiny shrub, glabrous or nearly so: lvs. oblong, obtuse, 1.5–3 cm. long; fls. about 8 mm. long. Fl.VII–VIII. (*A. kirghisorum* Schrenk.) S. Russia to Himal. Cult. 1878. Zone VI or VII.—Of no ornamental value; occasionally grown in bot. gardens from intr. seeds, difficult to cult. and usually of short duration; for sunny rockery. *A. maurorum* Med. (E.N.III.3:312) and *A. graecorum* Boiss. are similar, but probably tenderer.

36. **DESMÒDIUM** Desv. Herbs or shrubs: lvs. odd-pinnate, with 3–5, rarely 1, usually large lfts., stipulate: fls. small, mostly purple, in axillary or terminal racemes or panicles; calyx turbinate or campanulate, more or less 2-lipped; standard oblong to orbicular; wings adhering to the keel; upper stamen free at base, adnate toward the middle; style incurved, with small terminal stigma: pod lobed or jointed, usually separating into segments at maturity. (From Greek, *desmos*, chain; referring to the jointed pod.) About 150 species in N. and S. Am., E. and S. Asia, S. Afr., Austral., chiefly in the tropics.

D. tiliaefòlium Don. Upright shrub to 2 m.; brts. appressed-pubescent: lfts. 3, the terminal broad-obovate or rhombic-ovate, usually broad-cuneate, 5–10 cm. long, long-stalked, the lateral broad-ovate, smaller, short-stalked, slightly pubescent above and more densely pubescent beneath or nearly glabrous; petioles 3–7 cm. long; stipules deciduous: fls. pale lilac to dark pink, about 1.2 cm. long, in terminal large panicles; pedicels slender, 5–7 mm. long; calyx with broad and short teeth; keel shorter than wings: pod 5–7 cm. long, 6–9-seeded, appressed-pilose. Fl.VIII–X. B.M.2867(c). R.H.1902: 458(h),459. S.H.2:f.68a-f. Himal. Cult. 1883. Zone VII?—Ornamental shrub valued for its late fls. In cult. usually cut back by the frost to the ground, but the young shoots springing from the woody base usually flower the same season, as in the following species.—*D. nutans* Wall. is usually referred as a synonym to *D. tiliaefolium*, but may be distinct, differing in its more densely pubescent lvs. and grayish tomentulose pods. Intr. 1920.

A closely related species is **D. spicàtum** Rehd. Lfts. short-pubescent on both sides; terminal lft. orbicular-obovate, 3–4 cm. long, abruptly mucronate at apex, the lateral ones orbicular-ovate, smaller; petioles 1–3 cm. long; stipules persistent: fls. rosy-lilac to rose-carmine in many-fld. spikes to 10 cm. long, sometimes with smaller ones at base; fr. curved, to 5 cm. long, usually 5-seeded, appressed-pubescent. Fl.IX–X. B.M.8805(c). (*D. cinerascens* Hutchins., not Franch., nor Gray.) S. W. China. Intr. 1896, Zone VII.—Other species are: **D. floribúndum** G. Don. Shrub to 1.5 m.; lfts. dark green and glabrous above, gray, appressed-pilose and reticulate beneath, the terminal one elliptic or rhombic-elliptic, 5–7.5 cm. long, obtuse and mucronulate, narrowed toward the abruptly rounded base, the lateral ones smaller, rounded at base: petiole 1.5–3.5 cm. long, slightly pilose: fls. rosy-purple, in large terminal panicles; calyx-teeth ovate to lance-ovate: pod 1–2 cm. long, 3–5-seeded, appressed-pilose. Fl.XI. B.M.2960(c). B.R.967(c). (*D. dubium* Lindl.) Himal., China. Intr. 1823 and again from China 1908. Zone VII.—*D. sambuense* DC. intr. 1919 may not be specifically different.—Closely related to the preceding is **D. amethýstinum** Dunn. Lfts. elliptic, 10–16 cm. long, subcoriaceous, slightly silky and lustrous above, grayish villous beneath: fls. amethyst-colored in large terminal panicles; calyx glabrous: pod glabrous. China. Intr. about 1900. Zone VII?—Another species with glabrous pods is **D. oxyphýllum** DC. Lfts. finally glabrous above, grayish green and closely villous-tomentose beneath, slightly reticulate, the terminal one broad-rhombic to rhombic-ovate, 4.5–7.5 cm. long, acute or acuminate, broad-cuneate, the lateral ones smaller, rhombic-ovate; petioles 1.5–4 cm. long, slightly pilose or nearly glabrous: fls. violet-purple in broad panicles 10–20 cm. long, with slender spreading brs.; calyx short, with short broad lobes, glabrous: pod 2.5–6 cm. long, 2–7-seeded. (*D. serriferum* Wall.) Himal., S. W. China. Intr. 1909. Zone VII?

37. **LESPEDÈZA** Michx. Herbs or deciduous shrubs or subshrubs; winter-buds with several outer scales: lvs. 3-foliolate, rarely 1-foliolate; lfts. entire, without stipels; stipules subulate, deciduous: fls. usually purple to pink or white to yellowish, in axillary racemes or heads, sometimes partly apetalous; pedicels not articulate, usually 2 in the axils of persistent bracts; calyx with short, subequal teeth; petals clawed; standard obovate to oblong; wings oblong, free or slightly adhering to keel; keel obtuse, incurved; upper stamen free, rarely adhering; style incurved, with small terminal stigma: pod short, ovate or elliptic, compressed, rarely subglobose, often reticulate, 1-seeded, not dehiscent. (Lespedez, a Spanish governor of Florida, who aided Michaux.) About 50 species in N. Am., Asia and Australia.

A. Lfts. large; petioles 1.5–3.5 cm. long: fls. usually purple, stalked, in racemes.
B. Lfts. obtuse or emarginate; calyx-teeth as long or shorter than tube. . . . . 1. *L. bicolor*
BB. Lfts. acute or acuminate; calyx-teeth longer than tube, long-acuminate. . . 2. *L. formosa*
AA. Lfts. 1–2 cm. long, linear-oblanceolate, short-stalked: fls. yellowish, in 1–6-fld. heads. 3. *L. sericea*

1. **L. bícolor** Turcz. Shrub to 3 m.; brts. angular, sparingly pubescent at first: lfts. 3, broad-oval to obovate, 2–5 cm. long, rounded at apex and bristle-tipped, dark green above, grayish green beneath and sparingly appressed-pubescent, the middle one long-stalked; petiole glabrous or sparingly hairy: fls. about 1 cm. long, rosy-purple, in axillary racemes with the slender stalk 4–8 cm. long, forming loose and large panicles at the end of the brs.; calyx silky, with ovate to triangular-lanceolate teeth: pod broad-elliptic, rostrate, 6–8 mm. long, slightly appressed-pubescent. Fl.VIII–IX. G.F.5:114. B.C. 4:1844. S.H.2:f.70f,71a-d. N. China to Manch. and Japan. Intr. 1856. Zone IV.—Var. **alba** Bean. Fls. white.—Handsome shrub, valuable for its late fls.

Related species are: **L. cyrtobótrya** Miq. Lfts. smaller, usually broad-cuneate, pubescent beneath: fls. smaller, rosy-purple, in few-fld. capitate racemes, shorter than the lvs.; calyx-teeth lanceolate, acuminate, about as long as tube. S.H.2:f. 70h(l). Japan, Korea. Intr. 1899. Zone V.—**L. Delavaýi** Franch. Shrub to 2 m.: lfts. broad-elliptic, rounded at apex, silky white-tomentose beneath: fls. deep violet, changing to dark purple, in large terminal panicles; calyx densely silky. R.H.1890: 216. M.O.146. S. W. China. Cult. 1890. Zone VIII?

2. **L. formòsa** Koehne. Shrub to 2 m.; young brts. grooved, pubescent at first: lfts. 3, elliptic to elliptic-oblong, 3–5 cm. long, acute to obtusish, appressed-pubescent beneath, the middle one long-stalked; petiole appressed-pubescent: fls. rosy-purple, 1.2 cm. long, in racemes 8–20 cm. long, forming terminal panicles 60–80 cm. long; calyx-teeth lanceolate: pod elliptic, 6–8 mm. long, silky. Fl.IX–X. B.M.6602(c). R.H.1873:210,t(c). F.S.18:t.1888(c). G.F.5:115. B.C.4:1845. S.L.243(h). (*L. Sieboldii* Miq., *L. racemosa* Dipp., *L. bicolor* var. *Sieboldii* Maxim., *Desmodium penduliflorum* Oudem.) N. China, Japan. Intr. 1837. Zone (V), VI; usually dying to the ground.—Var. **albiflòra** Schindl. Lfts. smaller: fls. smaller, white, with violet markings at base of standard. (*L. Sieboldii* var. *a.* Schneid., *L. japonica* Bailey, *Desmodium japonicum* Hort.) Cult. before 1900.—Very graceful and handsome shrub, valued for its late fls.

A related species is **L. Buèrgeri** Miq. Lfts. elliptic-ovate, acute or acuminate, more pubescent beneath: fls. purple to white, about 8 mm. long, in shorter racemes: pod elliptic, acute at ends, 1–1.4 cm. long. S.H.2:f.70k(l). Fl.VII–IX. Japan. Intr. 1894. Zone V.—Var. **praècox** Nakai. Fls. purple, in June and July. Korea. Intr. 1917.

3. **L. serícea** Miq. Subshrub to 1 m. with virgate brs.: lfts. 3, subsessile, linear-oblanceolate, 1–2 cm. long, cuneate, truncate or emarginate, silky-pubescent beneath; petiole 5–15 mm. long: fls. whitish, subsessile, 6

mm. long, in dense clusters shorter than the lvs.; calyx deeply divided into linear-lanceolate teeth, ⅔ as long as corolla; pod broad-oval, 1.5–2 mm. long. Fl.VIII–IX. S.H.2:f.70l,71k-m. (*L. cuneata* G. Don, *L. juncea* var. *s.* Maxim., *L. j.* var. *cuneata* Bean.) China, Korea, Japan, Formosa, Himal. Intr. 1892. Zone V.—Of little ornamental value.

A closely related species is **L. júncea** Pers. Lfts. oblanceolate, 8–18 mm. long, cuneate, acute, grayish pubescent: fls. white or partly blue, 6–8 mm. long, in short-stalked 2–6-fld. clusters: calyx with lanceolate lobes about as long as tube. Fl.IX. Linné f.Dec.1:t.4. N. China to Amurl. Intr. 1895. Zone V.

38. **CAMPYLÓTROPIS** Bge. Deciduous shrubs: lvs. 3-foliolate; the terminal lfts. slender-stalked: fls. usually purple, in axillary racemes crowded into panicles at the end of the brs.; pedicels slender, solitary in the axils of deciduous or persistent bracts, articulate below the calyx; calyx campanulate, 5-parted, the 2 upper teeth connate; keel curved, rostrate: otherwise much like Lespedeza. (Greek *kampylos*, curved, and *tropis*, keel; referring to the curved keel.) About 40 species in E. and S. Asia.

C. macrocárpa Rehd. Shrub to 1 m.; brts. subterete, silky, pubescent when young: lfts. elliptic to oblong, 2–5 cm. long, obtuse to emarginate, glabrous above, silky-pubescent below; petioles 1.5–3.5 cm. long: fls. purple, about 1 cm. long, in rather dense racemes to 8 cm. long; pedicels 5–7 mm. long; calyx-teeth acute, shorter than tube; pod elliptic, 1.2–1.5 cm. long. Fl.VIII–IX. S.H.2:f.69h-l,70a. (*C. chinensis* Bge., *Lespedeza macrocarpa* Bge.) N. and C. China. Cult. 1871. Zone V.—Handsome shrub similar to *Lespedeza formosa*.

A related species is **C. Falcòneri** Schindl. Brts. striate, appressed-pubescent; lfts. obovate, 1–4 cm. long, obtuse or emarginate, pubescent beneath: fls. purple, in dense racemes, 5–20 cm. long; pedicels 2–5 mm. long; bracts persistent: pod 7–9 mm. long, densely silky-pubescent. B.R.32:28(c). (*Oxyrhamphis macrostyla* Lindl., not Wall., *Lespedeza dubia* Schindl., *L. eriocarpa* Bak., partly.) N. W. Himal. Intr. 1837 and 1920. Zone ?

Tribe 8. PHASEOLEAE Taub. Lfts. 3, with stipels: rachis of infl. usually thickened at the insertion of the fls.: pod 2-valved, dehiscent.

39. **PUERÀRIA** DC. Twining herbs or shrubs: lvs. 3-foliolate, with large stipellate sometimes lobed lfts., stipulate: fls. blue-purple or violet in long and dense axillary racemes; bracts and bractlets small, caducous; calyx campanulate, with unequal lobes, the 2 upper ones more or less connate; standard orbicular or obovate, auricled, clawed; wings oblong, usually adhering to the keel in the middle; upper stamen free at base, adnate at the middle, rarely free; ovary subsessile, many-ovuled; style incurved, with small terminal stigma: pod elongated, compressed or terete, 2-valved. (M. N. Puerari, botanist of Geneva.) More than 10 species in trop. Asia, Japan, and Guinea.

P. Thunbergiàna Benth. KUDZU VINE. High climbing vine with fleshy tuberous root; brts. striped, appressed-pilose; lfts. entire or slightly lobed, the middle one rhombic-ovate, to 18 cm. long, the lateral ones obliquely ovate, smaller, appressed-pubescent, sometimes glabrescent above, ciliate; petioles 10–20 cm. long, pubescent: fls. violet-purple, 1.5 cm. long, in dense upright pubescent racemes to 25 cm. long; stamens usually all connate: pod oblong-linear, 4–9 cm. long and 6–8 mm. broad, hirsute. Fl.VII–VIII. Gt.45: t.1429(c). G.F.6:505. A.G.13:387;21:505. R.H.1891:31. Gn.61:161. G.W. 5:605. (P. *hirsuta* Schneid., not Kurz, *Pachyrhizus Thunbergianus* S. & Z., *Dolichos japonicus* Hort.) China, Japan. Cult. 1885. Zone VI?; stems usually winter-killed, but grows again from the root.—Cult. for ornament as a fast growing large-leafed vine, also as a fibre plant; the root yields starch.

Fam. 42. **ZYGOPHYLLACEAE** Lindl. CALTROP FAMILY

Shrubs, rarely trees, or subshrubs, rarely annual herbs: lvs. opposite, rarely alternate, usually abruptly pinnate, rarely odd-pinnate or simple, stipulate: fls. perfect, regular, usually in terminal circinate infl.; sepals 5, rarely 4, imbricate, rarely valvate, sometimes wanting; stamens 10 or 8, rarely 15, obdiplostemonous, often with stipular appendages; anthers affixed in the middle; ovary superior, 4–5-, rarely 2–12-celled, often with disk at base; ovules 1–several, pendulous; style and stigma 1: fr. a caps., rarely a berry or drupe or splitting into carpels.—About 21 genera with 150 species.

A. Lvs. opposite, pinnate: fr. a capsule.....1. *Zygophyllum*
AA. Lvs. alternate, simple: fr. a drupe.....2. *Nitraria*

1. **ZYGOPHÝLLUM** L. Low, usually prostrate shrubs or subshrubs, rarely annuals, with fleshy stems and lvs.: lvs. abruptly pinnate, with usually 1 pair of lfts.: fls. solitary or 2, white, yellow or red, 4–5-merous; petals clawed; stamens usually with appendages at base; disk angled and fleshy: fr. a 2–5-angled caps., sometimes winged; cells with 1–several seeds; seeds with thin albumen and oblong cotyledons. (Greek *zygos*, yoke, and *phyllon*, leaf; referring to the paired lfts.) About 60 species, chiefly in the desert regions of the Old World.

Z. xanthóxylum Maxim. Shrub to 1.5 m., often spinescent; brts. glabrous: lfts. 2, linear, about 2 cm. long, fleshy, grayish green: fls. 4-merous; petals cuneate-oblong; stamens longer than petals: fr. 2–3-winged, about 2.5 cm. long and nearly as broad, indehiscent. (*Sarcozygium x.* Bge.) Linnaea, 17:1,t. D.L.2:358. Mongolia. Intr.? Zone IV? or V.—Possibly cult. in some botanical garden; inhabits saline deserts and is difficult to grow.—*Z. Fabago* L. sometimes cult. is herbaceous.

2. **NITRÀRIA** L. Deciduous shrubs with usually spiny brs.: lvs. spatulate, fleshy, entire or crenate, stipulate: fls. small, yellowish green in terminal loose circinate infl.; sepals 5, imbricate, connate at base, persistent; petals valvate, concave; stamens 15–10, without appendages; ovary 3-celled; stigmas 3; each cell with 1 ovule: drupe with thin exocarp and bony endocarp, 1-seeded. (Name referring to the fact that the plant yields soda.) Four species in S. Russia, C. Asia and E. Siberia, N. Afr., Austr.

N. Schòberi L. Low spiny shrub with appressed-silky brts.: lvs. fascicled, oblong-spatulate, 2–3 cm. long, entire, finely silky; stipules deciduous: fls. about 8 mm. across; sepals triangular, short; petals oblong: fr. conic-oblong, 8–10 mm. long. E.N.III.4:91. S.H.2:f.73a-k. S. Russia to E. Siberia and Beluch. Cult. 1819. Zone IV?—Of only botanical interest and rarely cult. in botanical gardens; inhabits saline deserts.

Fam. 43. **RUTACEAE** Juss. RUE FAMILY

Shrubs, trees or herbs; lvs. alternate, rarely opposite, simple or compound, usually with pellucid dots, estipulate: fls. usually perfect and usually regular, 4–5-merous; sepals often cohering, imbricate; petals imbricate or valvate, sometimes wanting; stamens 8–10, rarely 15 or more, inserted at base of a ring-like or cup-like crenate or dentate disk; ovary superior, often raised on a prolongation of the floral axis; carpels 4–5, rarely 1–3, connate or sometimes free at base and united by the styles or stigmas; carpels usually 2-ovuled; styles or stigmas connate: fr. a caps. or berry, or separating into several dehiscent or drupe-like fruitlets, rarely winged.—About 120 genera

with about 1000 species, mostly in trop. countries, but extending into the temp. regions of Eurasia and America.

A. Lvs. compound.
B. Lvs. pinnate.
C. Lvs. alternate.
D. Lvs. odd-pinnate; brs. prickly: fr. of dehiscent follicles.....1. *Zanthoxylum*
DD. Lvs. doubly pinnately dissected; small subshrubs: fr. a dehiscent capsule..5. *Ruta*
CC. Lvs. opposite, odd-pinnate: trees.
D. Winter-buds free in the axils of the lvs.: fr. of dehiscent follicles.....2. *Evodia*
DD. Winter-buds enclosed in base of petiole: fr. a drupe.....7. *Phellodendron*
BB. Lvs. 3-foliolate.
C. Lvs. opposite, evergreen: fls. conspicuous, white: fr. dehiscent.....4. *Choisya*
CC. Lvs. alternate: deciduous.
D. Brs. unarmed: fls. greenish-white in corymbs: fr. a winged samara.....6. *Ptelea*
DD. Brs. spiny, bright green: fls. white, before the lvs. fr. a large berry....9. *Poncirus*
AA. Lvs. simple.
B. Lvs. deciduous: fls. small, greenish, in racemes or solitary: fr. a dehiscent capsule.3. *Orixa*
BB. Lvs. evergreen: fls. white, in dense terminal panicles: fr. a small red or black drupe.
8. *Skimmia*

1. ZANTHÓXYLUM L. Deciduous or evergreen aromatic trees or shrubs, sometimes scandent, usually prickly, the prickles mostly in infrastipular pairs; winter-buds small, superposed, with indistinct scales: lvs. alternate, odd-pinnate, rarely 3-foliolate; lfts. opposite, sessile or subsessile, entire or serrate, with pellucid dots: fls. small, dioecious or polygamous, in panicles or rarely fascicled, 3–8-merous; perianth simple or consisting of sepals and petals; filaments subulate; staminate fls. with rudimentary carpels; carpels in pistillate fls. 5–1, each distinctly stipitate, 2-ovuled; style elongated, with capitate stigma: mature carpels with a thin exocarp separating from the endocarp, 2-valved, each with 1 shiny black subglobose or ellipsoid albuminous seed. (Greek *xanthos*, yellow, and *xylon*, wood.) Syn.: *Xanthoxylum* Gmel. About 150 species in trop. and subtrop. regions in both hemispheres; few in temp. regions.

A. Fls. before the lvs. in axillary fascicles: lfts. 5–11, pubescent beneath....1. *Z. americanum*
AA. Fls. after the lvs. in corymbs at end of lateral or rarely terminal brts.: lfts. glabrous or nearly glabrous beneath.
B. Lf.-rachis broadly winged: lfts. 3–5, 3–12 cm. long.....2. *Z. alatum*
BB. Lf.-rachis not or slightly winged.
C. Lfts. subsessile; prickles straight: fr. not beaked.
D. Prickles stout with much flattened broad base: lfts. 7–11, 1.5–5 cm. long.
3. *Z. Bungei*
DD. Prickles slender: lfts. 11–21, not more than 3 cm. long.
E. Prickles in pairs: fls. with simple perianth.....4. *Z. piperitum*
EE. Prickles solitary: fls. with sepals and petals.....5. *Z. schinifolium*
CC. Lfts. petioluled, 7–13, 3–7 cm. long; prickles mostly recurved.....6. *Z. stenophyllum*

Subgen. I. EUZANTHOXYLUM Endl. Fls. with simple perianth.

1. **Z. americànum** Mill. PRICKLY ASH (Toothache-tree). Shrub or small tree, to 8 m.; young brts. pubescent, with prickles about 1 cm. or less long: lfts. 5–11, ovate or elliptic, 3–6 cm. long, acuminate, entire or crenulate, dark green above, lighter and pubescent beneath, particularly on the midrib: fls. before the lvs., small, yellowish green, in axillary clusters on last year's brts.; pedicels of pistillate fls. 1–6 mm. long, of staminate shorter: fr. blackish, about 5 mm. long; seeds black. Fl.IV–V; fr.VIII. M.A.1:33(c). E.N.III. 4:f.65A–G. B.B.2:444. S.H.2:f.74a-i. (*Z. fraxineum* Willd.) Que. to Neb. and Va. Intr. about 1740. Zone IV.

2. **Z. alàtum** Roxb. var. **planispìnum** Rehd. & Wils. Shrub to 4 m.; brts. glabrous; prickles with broad flattened base to 2 cm. long: lfts. 3–5, ovate to ovate-lanceolate, 3–12 cm. long, the terminal one the largest, acuminate, finely serrulate, glabrous; rachis and petioles broadly winged: fls. yellowish, in small panicles 3–4 cm. long; carpels about 5 mm. long, red, warty; seeds lustrous black. Fl.VI; fr.IX. B.M.8754(c). S.I.2:t.34(c). R.H.1913:17(h).

G.35:213. China, Korea, Japan. Cult. 1880. Zone VI.—The typical form from the Himal. differs chiefly in its 5–11 lfts.

3. **Z. simulans** Hance. Spreading shrub to 3 m. or small tree to 7 m.: brts. slightly pubescent or glabrous; the stout prickles 6–20 mm. long with a very broad and flattened base to 1.5 cm. wide: lfts. 7–11, ovate to ovate-oblong, 1.5–5 cm. long, the terminal one usually stalked, crenate-serrulate, glabrous; rachis and often the midrib of the lfts. beneath prickly: fls. in sessile corymbs or short panicles 4–6 cm. broad: fr. reddish. Fl.VI–VII; fr. IX–X. D.L.2:348(l). S.H.2:f.74k-m. (*Z. Bungei* Planch.) N. and C. China. Intr. 1869. Zone V.—Handsome shrub with lustrous foliage.

4. **Z. pipéritum** DC. Shrub or small tree; brts. pubescent when young; prickles rather slender, to 1 cm. long, in infrastipular pairs: lfts. 11–19, ovate to oblong-ovate, 1–3.5 cm. long, the terminal one subsessile, emarginate, cuneate, remotely toothed with a conspicuous gland at the base of each tooth, glabrous; rachis pubescent above, often with a few prickles: fls. greenish, in small corymbs 1.5–3 cm. across; style slender: fr. reddish, gland-dotted; seeds black. Fl.VI; fr.IX. S.I.1:t.52(c). E.N.III.4:f.65J–L. S.H.2:f. 74n-s. N. China, Korea, Japan. Cult. 1877. Zone VI?

A related species is **Z. Piasézkii** Maxim. Shrub to 3 m.: lfts. 7–15, ovate or obovate to oblong, 8–25 mm. long, slightly crenulate or nearly entire; rachis glabrous: fls. in small corymbs; style short: fr. reddish, warty. W. China. Intr. 1897. Zone V or VI.

Subgen. II. FAGARA G. Don. Fls. with sepals and petals.

5. **Z. schinifòlium** Sieb. & Zucc. Shrub or small tree; brts. glabrous, with a solitary prickle to 1.2 cm. long at the nodes: lfts. 13–21, elliptic-lanceolate to lanceolate, 1.5–3.5 cm. long, emarginate at apex, crenate-serrulate, glabrous; rachis prickly: fls. greenish in terminal short-stalked corymbs 5–10 cm. across: fr. greenish or brownish, about 4 mm. long; seeds blue-black. Fl.VI; fr.IX–X. Ad.10:t.326(c). S.I.2:t.33(c). S.H.2:f.75a-c. (*Fagara schinifolia* Engl.) Japan, Korea. Cult. 1877. Zone V.—Graceful shrub with neat foliage and rather conspicuous fruit in autumn.

6. **Z. stenophýllum** Hemsl. Scandent shrub to 3 m.; brts. glabrous, with small curved or straight prickles: lfts. 7–13, ovate-oblong to lanceolate, 3.5–7 cm. long, acuminate, cuneate, denticulate, glabrous; rachis usually with slender hooked prickles: fls. in terminal loose corymbs 5–9 cm. across; stamens exserted: fr. reddish, beaked; seeds black. Fls.VI. (*Fagara stenophylla* Engl.) W. China. Intr. 1908. Zone VI or VII.

Z. ailanthoides S. & Z. from Japan and *Z. dissitum* Hemsl. from China are not hardy within our area.

2. **EVÒDIA** Forst. Deciduous or evergreen trees or shrubs; winter-buds naked: lvs. opposite, petioled, simple or pinnate with entire or nearly entire punctate lfts.: fls. unisexual, usually 4-merous, sometimes 5-merous, small, in terminal or axillary panicles or corymbs; sepals imbricate; petals valvate or slightly imbricate; stamens 4–5, at the base of a cupular disk; carpels 4–5, nearly free or connate, 2-ovuled; style cylindric: fr. of 4–5 2-valved pods, 1–2-seeded; seeds ellipsoid or subglobose; albumen with straight embryo. (Greek *euodia*, pleasant odor.) About 50 species in E. and S. Asia, Austr. and Polynesia.—Sometimes planted as ornamental trees.

A. Lfts. 5–11, glabrous beneath or pubescent only along the midrib: fr. beaked at apex.
  B. Lfts. subsessile or short-stalked, with long villous hairs along the midrib and sometimes along the veins and green beneath ..... 1. *E. Daniellii*
  BB. Lfts. distinctly stalked, glabrous or with short hairs along the base of the midrib and glaucescent or pale beneath ..... 2. *E. Henryi*
AA. Lfts. 7–15, pubescent beneath: fr. rounded at apex ..... 3. *E. officinalis*

1. **E. Daniéllii** Hemsl. Small tree: brts. pubescent at first, red-brown with large pale lenticels the second year: lfts. 7–11, ovate to oblong-ovate, 5–10 cm. long, acuminate with an obtusish point, rounded at base, sometimes broad-cuneate or subcordate, finely crenulate, light green beneath; petiole 3–6 cm. long: fls. 3–4 mm. long, whitish, in puberulous corymbs 10–16 cm. across, with the stalk of the lower brs. 3–9 cm. long: pods about 8 mm. long, slightly puberulous or nearly glabrous with a short usually hooked beak; seeds ellipsoid, 3.5 mm. long, lustrous brownish black or black. Fl.vi; fr.ix. H.B.1923:61. (*Zanthoxylum D.* Benn.) N. China, Korea. Intr. 1905. Zone V.

2. **E. Hénryi** Dode. Tree to 8 m.; brts. as in No. 1: lfts. 5–9, oblong-ovate to lance-ovate, 6–10 cm. long, acuminate, rounded or narrowed at base, crenulate: fls. 4–5 mm. long, pinkish white, in puberulous panicles 5–6 cm. across, with the stalk of the lower brs. 1–2.5 cm. long: pods reddish brown, about 6 mm. long, sparingly hairy, with the slender beak about half as long; seeds ellipsoid, black. Fl.vi; fr.ix. C. China. Intr. 1907. Zone V.

A closely related species is **E. hupehénsis** Dode. Lfts. ovate to oblong-ovate, usually rounded and oblique at base, rarely broad-cuneate, entire or slightly crenulate on young plants, light green beneath: fls. smaller, in broad-pyramidal corymbs 8–16 cm. across with the stalks of the lower brs. 2.5–6.5 cm. long: pods pubescent, 5–6 mm. long. Fl.vi–vii: fr.ix–x. R.H.1924:81. G.C.III.78:429. C. China. Intr. 1907. Zone V.—A species with beaked fr. and pubescent lfts. is **E. velùtina** Rehd. & Wils. Tree to 12 m.; brts. velutinous: lfts. 7–11, oblong-ovate to lance-oblong, 6–10 cm. long, nearly rounded at base, soft-pubescent on both sides: infl. broad-paniculate, to 16 cm. broad: pods 4–5 mm. long, with short beak. W. China. Intr. 1908. Zone VI?

3. **E. officinàlis** Dode. Shrub or small tree to 5 m.; brts. pubescent while young: lfts. 7–15, short-stalked, ovate or elliptic-ovate, rarely oblong, 5–8 cm. long, acuminate or short-acuminate, cuneate to broad-cuneate, rarely nearly rounded at base, glabrous above except on midrib or sparingly hairy when young, pubescent beneath: infl. a pubescent corymb 6–11 cm. broad; pods reddish, warty, rounded at apex, 5–6 mm. long; seeds suborbicular, 4 mm. long, shining steel-blue. Fl.vii; fr.x–xi. C. and W. China. Intr. 1907. Zone VI?

A closely related species is **E. Bodinièri** Dode. Bush to 3 m.: lfts. 5–11, elliptic-ovate to narrow-oblong, 4–10 cm. long, short and obtusely acuminate, cuneate, glabrous above, pubescent at least on the midrib beneath: infl. loose, 6–13 cm. across, pubescent. C. and W. China. Intr. 1910. Zone VI or VII?—*E. glauca* Miq. from E. and C. China does not seem to be hardy within our area.

3. **ORÍXA** Thunb. Deciduous shrub; winter-buds small, with imbricate scales: lvs. alternate, entire, short-petioled, with pellucid dots: fls. dioecious greenish, small, 4-merous, on last year's brts.; sepals ovate, connate below; petals elliptic, imbricate in bud; staminate fls. in racemes, with a 4-lobed disk and 4 stamens shorter than petals and somewhat longer than sepals; pistillate fls. solitary with 4 small sterile stamens and 4 carpels united at base and at apex by the short style with 4-lobed stigma: fr. of 4 compressed, 2-valved carpels, cohering only at base, each with a subglobose black albuminous seed; embryo slightly curved with broad cotyledons. (Japanese name.) One species.

O. japónica Thunb. Shrub to 3 m., with spreading brs. pubescent when young: lvs. obovate to oblong, 5–12 cm. long, obtusely pointed, entire or finely crenulate, bright green above, pubescent on the veins at least when young; petiole about 1 cm. long: fls. about 6 mm. across; fr. almost 8 mm. high and 1.8 mm. across, brown. Fl.iv–v. I.T.3:t.101. Gt.35:t.1232(c).

E.N.III.4:f.67T–Z. B.C.4:2407. S.L.278(h). (*Celastrus Orixa* S. & Z., *C. japonica* K. Koch, *Othera Orixa* Poir., *Evodia ramiflora* Gray.) Japan. Cult. 1870. Zone V.—Ornamental shrub with bright green lvs. of pungent odor when bruised.

4. **CHOÌSYA** Kunth. Evergreen shrub, aromatic: lvs. opposite, 3-foliolate; lfts. entire, subsessile, with pellucid dots: fls. white, rather large, perfect, 5-merous, in terminal and axillary slender-stalked 3–6-fld. cymes clustered at the end of the brts.; sepals ovate, thin, deciduous; petals about 4 times as long as sepals, imbricate, finally spreading; stamens 10, much shorter than petals, with flattened, lanceolate filaments, inserted at base of the thick gynophor; carpels 5, connate at base, each with 2 ovules; style with 5-lobed stigma: fr. of 5 2-lobed carpels, with the endocarp separating. (Named for J. D. Choisy, Swiss botanist; 1799–1859.) One species.

C. ternàta Kunth. MEXICAN ORANGE. Shrub to 3 m. forming a round bush; young brts. pubescent: lfts. 3, rarely 2 or 4, obovate-oblong to oblong, 3–7 cm. long, obtuse, cuneate, leathery, glabrous; petiole 1–5 cm. long, pubescent: fls. 2.5–3 cm. across, fragrant; petals oblong-obovate. Fl.(IV) V–VI. R.H.1869332,t(c). Gt.25:t.876(c). Gn.12:232,t(c);85:113(h);86:948(h). G.C.III.41:382. B.S.1:341. J.L.40:f.3(h). (*C. grandiflora* Reg.) Mexico. Intr. 1866. Zone VII?—Ornamental shrub with fragrant white fls. in spring.

5. **RÙTA** L. RUE. Herbs or subshrubs, glandular-punctate and aromatic: lvs. alternate, simple, 3-foliolate or pinnately compound: fls. perfect, regular, 4–5-merous, yellow, in terminal cymes or corymbs; sepals connate at base, persistent; petals oblong-obovate, concave with denticulate or fringed margin, imbricate in bud; stamens 8–10; disk large, very deeply 4–5-lobed; style with small stigma: fr. a 4–5-lobed capsule with many-seeded cells, dehiscent or indehiscent; seeds angular, albuminous; embryo slightly curved. (Ancient Latin name of the plant.) About 40 species. Mediterr. region and Canary Isls. to E. Siberia.

R. gravéolens L. RUE. Evergreen subshrub to 1 m., glabrous: lvs. bipinnately dissected, 6–12 cm. long, with obovate-oblong to obovate lobes, bluish green, of strong odor: fls. dull yellow, nearly 2 cm. across, in terminal large and loose cymes; petals very concave, with fringed margin. Fl.VI–IX. F.D.21:t.2088(c). R.I.5:t.157(c). H.A.6:t.8(c). (Herb of Grace.) S. Eu. Cult. since ancient times and naturalized elsewhere in Eu. and sometimes in N. Am. Zone V.—Var. **variegàta** West. Lvs. variegated with white.—An old medicinal plant of little ornamental value. There are several closely related species in cult., but these are even less woody and of no importance.

A closely related genus is **Boenninghausènia** Reichb. differing chiefly in the smaller whitish fls., stipitate ovary and carpels being connate only at base. The only species is **B. albiflòra** Reichb. Glabrous slender subshrub to 0.5 m.: lvs. up to thrice pinnate; lfts. broad-obovate to oval, 4–15 mm. long, obtuse: fls. in loose leafy panicles, white, 6–8 mm. long; carpels about 4 mm. long. Fl.VIII–IX. E.N. III.4:130,f.B-F. Himal. to E. Asia. Cult. 1885. Zone VI?—Rarely cult.

6. **PTÉLEA** L. Deciduous shrubs or small trees, aromatic; buds superposed, small, pubescent, the terminal one wanting: lvs. alternate, petioled, 3-foliolate, rarely 4–5-foliolate; lfts. subsessile, entire or crenulate, punctate with pellucid dots: fls. small, greenish white, polygamous, 4–5-merous, in corymbs terminal on short lateral brts.; petals oblong, short-pubescent outside, 3–4 times longer than the sepals, both imbricate; stamens 4–5, shorter than petals, in the staminate fls. inserted at the base of a short gynophore

bearing a sterile ovary, the filaments villose below; pistillate fls. with 4–5 small staminodes and with a compressed 2-, rarely 3-celled ovary; each cell with 2 ovules; style short: fr. a compressed usually broadly winged and suborbicular, 2-seeded indehiscent samara, rarely 3-celled and 3-winged; seed compressed with thin albumen; embryo straight with oblong cotyledons. (Greek name of the Elm tree; transferred to this plant on account of the similarity of the fruit.) About 7–10 variable species or according to Greene (in Contrib. U. S. Nat. Herb. 10:49–79) more than 60 species in N. Am. and Mex.

P. trifoliàta L. Hop-tree. Shrub or small round-headed tree to 8 m.; young brts. sparingly pubescent, red-brown the second year: lfts. ovate to elliptic-oblong, 6–12 cm. long, narrowed at ends, sometimes acuminate, the lateral ones oblique at base, smaller, entire or obscurely crenulate, dark green and lustrous above, pale and usually glabrous below: fls. about 1 cm. across, in corymbs 4–8 cm. broad: fr. suborbicular, 1.8–2.5 cm. across, emarginate at apex. Fl.vi: fr.viii–ix. S.O.2:t.76(c). G.O.t.74(c). M.A.1:t.34(c). S.S. 1:t.33,34. G.C.III.16:375. (Wafer Ash.) Ont. and N. Y. to Fla., w. to Minn.; sometimes escaped from cult. elsewhere. Intr. 1704. Zone IV.—Var. **aùrea** Behnsch. Lvs. yellow. A.F.14:1231(h). Orig. before 1886.—Var. **heterophýlla** DC. Lfts. narrower, occasionally 4 or 5.—Var. **fastigiàta** Bean. Brs. upright, forming a pyramidal bush.—Var. **pubéscens** Pursh. Lvs. pubescent beneath, dull and grayish green above: brts., petioles and infl. nearly glabrous. Occurs with the type.—Var. **móllis** Torr. & Gray. Young brts. infl. and lvs. beneath pubescent or tomentose. (*P. mollis* Curtis, ?*P. tomentosa* Raf.) N. C. to Fla. and Tex. Zone V.—Ornamental shrub grown for the handsome foliage and also for the attractive light colored fruit.

Related species in cult. are: **P. Baldwìnii** Torr. Shrubby; brts. brown: lfts. 3–6 cm. long, narrowly elliptic-ovate, or oblong-obovate, pubescent beneath: fls. larger, in smaller corymbs; fr. 1–1.5 cm. across, apiculate. (*P. angustifolia* Benth., *P. trifoliata* var. *angustifolia* Jones.) Calif. Intr. about 1893. Zone VII? —**P. polyadènia** Greene. Brts. dark brown, puberulous or tomentulose; lfts. elliptic-ovate, 3–6 cm. long, obtusish or acutish, crenate, bright green, short-villous beneath, subcoriaceous, strongly gland-dotted. Ariz., N. Mex. and Tex. Intr. 1916. Zone VI?—**B. nìtens** Greene. Brts. light yellowish brown, glabrate: lfts. rhombic-lanceolate, 3–5 cm. long, acute or acuminate, slightly crenate, glabrous or slightly pubescent along the midrib beneath, light green, strongly gland-dotted, chartaceous: fr. about 1.5 cm. across. Colo. Cult. 1912. Zone V.—**P. lutéscens** Greene. Brts. white and lustrous, glabrous; lfts. lanceolate, 3–6 cm. long, serrulate, densely and minutely gland-dotted: fr. about 2 cm. across. Ariz. Cult. 1918. Zone VI?

7. PHELLODÉNDRON Rupr. Deciduous trees, aromatic; buds small, naked, pubescent, enclosed by the base of the petiole: lvs. opposite, odd-pinnate, with 5–13 opposite crenulate lfts. punctate with pellucid dots: fls. dioecious, small, yellowish green, in terminal panicles or corymbs; petals 5–8, several times longer than the 5–8 lance-ovate sepals; staminate fls. with 5–6 stamens longer than petals and with a rudimentary pistil; anthers large, ovate, 2-lobed at base; pistillate fls. with 5–6 small staminodes and a 5-celled ovary on a short gynophore; style short and thick with a 5-lobed stigma: fr. a black, subglobose drupe with 5 small, 1-seeded stones; seed with thin albumen; embryo straight, with oblong flat cotyledons. (Greek *phellos*, cork, and *dendron*, tree; referring to the corky bark of the type species.) Eight or 9 species in E. Asia.—Ornamental trees grown for their handsome foliage turning yellow in autumn; the fls. appear in June and the fr. ripens in Sept. and Oct. and remains on the tree through most of the winter.

A. Lvs. glabrous beneath or with few hairs along the midrib, glaucous or glaucescent.
B. Bark thick, corky; lfts. ciliate.....1. *P. amurense*
BB. Bark thin: lfts. not or slightly ciliate.....2. *P. sachalinense*
AA. Lfts. pubescent beneath, at least on the veins, pale green or grayish green.
B. Infl. rather loose, about as broad as high: ovary glabrous.
C. Bark thick, corky: lfts. broadly cuneate at base.....3. *P. Lavallei*
CC. Bark thin: lfts. truncate or subcordate at base.....4. *P. japonicum*
BB. Infl. compact, higher than broad: ovary pubescent: lfts. oblong-lanceolate.
5. *P. chinense*

1. **P. amurense** Rupr. AMUR CORK-TREE. Tree to 15 m.; bark light gray, corky, deeply fissured; mature brts. orange-yellow or yellowish gray: lfts. 5–13, ovate to lance-ovate, 5–10 cm. long, long-acuminate, rounded or narrowed at base, dark green and lustrous above, glabrous beneath or with a few hairs along the base of the midrib: fls. about 6 mm. long in puberulous panicles 6–8 cm. high: fr. about 1 cm. across, of strong turpentine-like odor when bruised. S.I.2:t.33(c). S.T.1:t.93. K.D.348. Gs.2:37(b). H.B.3:466(h). S.L.287(h). N. China, Manch. Intr. about 1856. Zone IV.—Var. **albovariegàtum** Schwerin. Lfts. with large white blotches.

P. a. ×*japonicum*. Raised in 1902 in the Botanic Garden at Lund (see M.D. 1912:363).

2. **P. sachalinénse** Sarg. Tree to 15 m.; bark of trunk dark brown, slightly fissured and finally broken into thin plates; mature brts. reddish brown: lfts. 7–11, ovate to ovate-oblong, 6–12 cm. long, acuminate, cuneate or rounded at base, dull green above and glabrous or nearly so beneath: panicle nearly glabrous 6–8 cm. high: fr. about 1 cm. across. S.T.1:t.94. G.C.III.62:186. (*P. amurense* var. *s.* Fr. Schmidt.) Saghal., Korea, N. Japan and W. China. Intr. 1877. Zone IV.—This species is the hardiest and most satisfactory in cult.

3. **P. Lavállei** Dode. Tree to 10 or occasionally to 15 m.: bark corky; mature brts. purplish brown: lf.-rachis puberulous or pubescent; lfts. 5–13, elliptic-ovate to lance-oblong, 5–10 cm. long, acuminate, cuneate, dull yellowish green above, pubescent beneath when young, at maturity often only on the veins: infl. puberulous, 6–8 cm. broad: fr. about 8 mm. across. B.M. 8945(c). I.T.5:t.171 (as *P. amurense*). (*P. amurense* var. *L.* Sprague.) C. Japan. Cult. 1877. Zone V.

4. **P. japónicum** Maxim. Tree to 10 m., with dark brown thin and slightly fissured bark; mature brts. reddish brown: lf.-rachis densely villous or tomentose: lfts. 9–13, ovate to ovate-oblong, 6–10 cm. long, acuminate, truncate or subcordate at the very oblique base, dull green above, villous beneath, more densely on the veins: infl. hoary-tomentose, 5–7 cm. across: fr. about 1 cm. across. S.T.1:t.95. C. Japan. Intr. 1863. Zone V.

5. **P. chinénse** Schneid. Tree to 10 m.: bark dark grayish brown, thin, slightly fissured; mature brts. purplish brown: lfts. 7–13, oblong-ovate to lance-oblong, the margins nearly parallel, 7–14 cm. long, acuminate, rounded or broad-cuneate at base, dark yellowish green above, villous beneath: infl. densely pubescent, compact, paniculate, 5–6 cm. long: fr. about 1 cm. across. S.H.2:f.79c-d. S.L.287(hs). C. China. Intr. 1907. Zone V.—Var. **glabriúsculum** Schneid. Lfts. pubescent only on the veins beneath. (*P. sinense* Dode.) C. and W. China. Intr. 1907. Zone V.

8. **SKÍMMIA** Thunb. Evergreen glabrous shrub; buds with few outer scales, the terminal one lanceolate: lvs. alternate, short-petioled, entire, dotted with pellucid glands: fls. white, small, 4–5-merous, in terminal panicles, perfect or polygamous; the staminate fls. in larger panicles and fragrant; petals oblong, valvate or slightly imbricate, 3–4 times longer than the imbri-

cate sepals; staminate fls. with 4–5 stamens slightly shorter than petals and with sterile carpels united only at base; filaments filiform; anthers ovate, 2-lobed at base; pistillate fls. with 4–5 staminodes and 2–5 connate carpels, each with 1 pendulous ovule; style short, thick, with 2–5-lobed stigma; fr. an ovoid or obovoid or subglobose drupe with 2–4 1-seeded stones; seed with fleshy albumen; embryo straight with oblong flat cotyledons. (Japanese name Skimmi, meaning a hurtful fruit.) Nine species in Himal. and E. Asia. —Ornamental shrubs grown for their handsome evergreen foliage and the bright red berries and also for their fragrant staminate fls.

A. Lvs. generally oblong-obovate, obtusely pointed: fls. usually 4-merous, polygamous: fr. subglobose. ..... 1. *S. japonica*

AA. Lvs. generally oblong-lanceolate, acuminate: fls. usually 5-merous and perfect: fr. obovoid. 2. *S. Reevesiana*

1. **S. japónica** Thunb. Dense shrub to 1.5 m., but usually lower, glabrous except the puberulous infl.: lvs. crowded at end of brts., elliptic-oblong to oblong-obovate, 7–12 cm. long, bright or yellowish green above, yellowish green beneath: fls. usually dioecious, yellowish white, about 8 mm. across in panicles 5–8 cm. long: fr. globose or depressed-globose, 8 mm. across, bright red. Fl.IV–V; fr.X(–V). B.M.8038(c). G.C.III.5:521, 524. Gn.87:562(h). R.H.1869:259;1880:56. G.W.5:261(h). (*S. oblata* T. Moore, *S. fragrans* and *S. fragrantissima* Hort.) The two last synonyms are used for the staminate form. Japan. Cult. 1838. Zone VIII.—Var. **macrophýlla** Mast. A staminate form with larger lvs.

S. j. × *Reevesiana* = **S. Foremánii** Knight. Lvs. lanceolate or oblanceolate, yellowish green; petiole reddish: subglobose and obovoid scarlet frs. on the same panicle. G.C.III.5:553. Gn.61:160;67:57. (*S. intermedia* Rehd., not Carr.) Orig. before 1881.—Var. **Rogérsii** Rehd. Lvs. deep green; petiole greenish: fls. perfect; fr. depressed-globose, crimson. Orig. before 1878.

2. **S. Reevesiàna** Fort. Shrub to 0.5 m., similar to the preceding: lvs. lanceolate or oblong-lanceolate, 3–10 cm. long, acuminate, cuneate, dark green above, light green beneath: fls. usually perfect, white, in oblong-ovoid panicles 5–8 cm. long: fr. obovoid, dull crimson-red. Fl.IV–VI; fr.X(–V). B.M. 4719(c). Gn.7:183;8:519. G.C.III.5:525. R.H.1869:259;1880:56. (*S. japonica* Lindl., not Thunb., *S. Fortunei* Mast.) China. Intr. 1849. Zone VII?—Var. **rubélla** Rehd. Peduncles, pedicels and fl.-buds reddish; staminate form. R.H.1874:311,t(c);1885:189. (*P. Fortunei* f. *rubella* Voss, ?*P. intermedia* Carr.) Intr. 1865.—Var. **variegàta** Rehd. Lvs. bordered with white. (*S. Fortunei* var. *argentea* Mast.) Orig. about 1875.—This species being hermaphrodite fruits more freely and is hardier.

A related species is **S. Lauréola** Sieb. & Zucc. Shrub to 1.5 m.: lvs. oblong-obovate to lanceolate or oblanceolate, 8–16 cm. long, of heavy aromatic odor when bruised: fls. dioecious, in short dense panicles: fr. globose-ellipsoid, red. Wallich, Pl. As. Rar.3:t.245(c). Himal. Cult. 1868. Zone VIII.

9. **PONCÌRUS** Raf. Deciduous shrub or small tree with spiny green compressed brts.; buds small, subglobose, with few scales, glabrous: lvs. 3-foliolate; lfts. sessile with pellucid dots; petiole winged: fls. white, axillary, subsessile on last year's brts., before the lvs.; petals 5, oblong-obovate, imbricate in bud, spreading, much longer than the triangular sepals; stamens 8–10, free; ovary 6–8-celled, pubescent; cells with several ovules in 2 rows; style short and thick: fr. a large yellow berry with numerous seeds; seeds exalbuminous; embryo with large planconvex cotyledons. (French poncire, a kind of Citrus.) One species.

P. trifoliàta Raf. Shrub or small tree to 7 m., glabrous; spines stout, 1–4, occasionally to 7 cm. long: terminal lft. obovate to elliptic, 2.5–6 cm. long,

obtuse or emarginate, cuneate, crenulate, subcoriaceous, the lateral ones similar, but smaller and usually elliptic-ovate, very oblique at the base; petiole 8–25 mm. long: fls. 3.5–5 cm. across: fr. globose, 3.5–5 cm. across, yellow, tomentulose, fragrant; seeds oblong, 1–1.3 cm. long. Fl.IV–V; fr.IX–X. B.M.6513(c). G.C.III.14:265;27:269. R.H.1886:533. Gn.46:272,t.(c);86: 583(h). M.D.1914:278(h). G.W.20:529(h). S.L.146(h). (*Citrus t.* L., *C. triptera* Carr., *Pseudaegle sepiaria* Miq., *P. trifoliata* Mak.) N. China, cult. in Japan. Intr. about 1850. Zone VI.

There are hybrids of *P. t.* with several species and forms of Citrus of which those with *C. sinensis* Osb., the Common Orange, are the best known and are called Citranges (B.C.2:778), also with *Fortunella japonica* Swingle, the Kumquat.

Fam. 44. SIMAROUBACEAE DC. QUASSIA FAMILY.

Shrubs or trees with usually bitter bark: lvs. alternate, rarely opposite, pinnate, rarely simple, without pellucid dots: fls. perfect or unisexual, regular, usually small, in panicles or spikes; sepals 3–5, more or less connate, imbricate or valvate; petals 3–5, rarely wanting; stamens usually twice as many as petals, obdiplostemonous; ovary superior, usually surrounded by a prominent disk, consisting of 2–5 carpels, free at base and united by the styles or stigmas, or wholly connate; each carpel 1- or several-ovuled: fr. drupe-like, rarely a berry or samara; seed with thin albumen or without; embryo with thick planconvex or flat cotyledons.—About 28 genera with 150 species chiefly in the tropics, few extending into the temp. regions.

A. Infl. axillary: fr. a drupe: lfts. 7–15 ..... 1. *Picrasma*
AA. Infl. terminal: fr. a samara: lfts. 13–41 ..... 2. *Ailanthus*

1. **PICRÁSMA** Bl. Deciduous trees; buds naked, pubescent, the lateral ones flattened: lvs. alternate, odd-pinnate, estipulate, crowded at end of brts.: fls. polygamous, small, in axillary peduncled loose cymes; petals 4–5, oblong, valvate or nearly so, exceeding the ovate imbricate persistent sepals; stamens 4–5, inserted at base of the 4–5-lobed disk, longer than petals, with ovate anthers; carpels 5–2, free, but united by the slender style 5–2-parted at apex into slender stigmas: fr. of 5–1 obovoid or subglobose drupelets with thin sarcocarp; seed exalbuminous with thick planconvex cotyledons. (Greek *picrasmos*, bitterness; alluding to the bitter bark.) About 8 species in trop. and subtrop. regions.

P. quassioïdes Benn. Shrub or tree to 10 m.; brs. with reddish-brown bark marked with conspicuous yellow lenticels; lvs. 25–35 cm. long; lfts. 9–15, subsessile, ovate to oblong-ovate, 4–10 cm. long, acuminate, broad-cuneate or nearly rounded at the oblique base, crenate-serrate, lustrous above, light green and glabrous beneath except on the midrib when young: fls. greenish, about 8 mm. across, in slender-peduncled loose corymbs 8–15 cm. across: fr. globose-ovoid, 6–7 mm. long, red, supported by the persistent calyx. Fl.V–VI; fr.IX. S.I.1:t.53(c). S.H.2:f.82f-m,83a. (*P. ailanthoides* Planch., *P. japonica* Gray.) N. China and Korea to Himal. and Japan. Intr. 1890. Zone (V), VI.—Ornamental shrub or tree with handsome lvs. turning orange and scarlet in autumn; bark very bitter.

2. **AILÁNTHUS** Desf. Deciduous trees; buds suborbicular, with 2–4 scales, the terminal one wanting: lvs. alternate, odd-pinnate; lfts. 13–41, near the base usually with a few large teeth bearing each a large gland beneath: fls. small, polygamous, in large terminal panicles; petals 5–6, oblong, valvate in bud, several times longer than the partly connate sepals; stamens 10,

inserted at base of the 10-lobed disk; staminate fls. without rudimentary pistil; carpels 5–6, more or less connate or free below; stigmas elongated, spreading: fr. consisting of 1–6 free oblong samaras with the compressed seed in the middle; seed with thin albumen; embryo with obovate or suborbicular cotyledons. (*Ailanto*, the native name for *A. moluccana*, meaning tree of heaven.) Syn. *Pongelion* Rheede. Eight or 9 species in E. and S. Asia and N. Austr.

A. Brts. and petioles glabrous or puberulous: lfts. glabrous beneath.....1. *A. altissima*
AA. Brts. pubescent and at least on young trees prickly: lfts. pubescent beneath. 2. *A. Vilmoriniana*

1. **A. altíssima** Swingle. Tree of Heaven. Tree to 20 m.; bark smooth with pale stripes; young brts. minutely pubescent, becoming dull yellowish brown: lvs. 45–60 cm. long; lfts. 13–25, stalked, lance-ovate, 7–12 cm. long, usually truncate at base, finely ciliate, with 2–4 coarse teeth near base, glabrous and glaucescent beneath: fls. 7–8 mm. across, in panicles 10–20 cm. long; samaras 3–4 cm. long, light reddish brown. Fl.VI–VII; fr.IX–X. M.A.1:t. 35(c). G.C.III.78:207. Gn.24:63,65(h);32:330. B.C.1:241. F.L.19:105,t(h). M.D.1901:324(h). (*A. glandulosa* Desf., *A. cacodendron* Schinz & Thell., *A. japonica* Hort.) China. Intr. 1751. Zone V.—Var. **erythrocárpa** Rehd. Lvs. darker green above and more glaucous beneath: fr. bright red. (*A. e.* Carr., *A. rubra* Hort.) Orig. before 1867.—Var. **pendulifòlia** Rehd. Lvs. very large, drooping. R.H.1906:545(h). (*A. glandulosa pendulifolia* Carr.) Orig. before 1900.—Var. **sutchuenénsis** Rehd. & Wils. Young brts. glabrous, reddish-brown, lustrous; petioles purplish; lfts. not ciliate, cuneate at base, at least in older plants: fr. about 5 cm. long. B.D.1907:192, 193B. W. China. Intr. about 1895.—Ornamental trees grown for their handsome foliage and also, particularly var. *erythrocarpa*, for the conspicuous fr. in autumn; the staminate fls. exhale a disagreeable odor.

A closely related species is **A. Giráldii** Dode. Young brts. puberulous, brown or brownish: petioles purplish, finely pubescent: lvs. 50–90 cm. long; lfts. 33–41, close-set, lanceolate, 10–15 cm. long, long-acuminate, undulate, with 14–15 pairs of veins, pale green and loosely pubescent beneath: panicle 20–30 cm. long; fr. about 6 cm. long. B.D.1907:191, 193A,197B. W. China. Intr. about 1897. Zone V.—Var. **Ducloûxii** Dode. Brts. light orange; petiole green; lfts. sparingly pilose beneath, more densely on the veins. Cult. 1914.

2. **A. Vilmoriniàna** Dode. Tree to 16 m.: lvs. 50–90 cm. long: lfts. 17–35, lance-oblong, 10–15 cm. long, acuminate, with 2–4 coarse teeth near base, glabrous or pubescent above, glaucescent and pubescent beneath; petiole often red and sometimes prickly: panicle to 30 cm. long: fr. about 5 cm. long. R.H.1904:445. Gn.75:632(h). B.D.1907:193C. (*A. glandulosa* var. *spinosa* Bois.) W. China. Intr. 1897. Zone VI?—Similar to *A. altissima* but not quite as hardy.

Fam. 45. MELIACEAE Vent. Mahogany Family.

Trees or shrubs, rarely subshrubs or herbs: lvs. alternate, very rarely opposite, pinnate, rarely simple, estipulate: fls. perfect, rarely unisexual, regular, in usually axillary panicles; sepals 4–5, usually partly connate, imbricate; petals 4–5, rarely 3–10, valvate, imbricate or convolute, distinct or sometimes connate at base; stamens usually twice as many as petals, usually more or less connate into a tube below, rarely free; ovary superior, surrounded at the base by a disk, 2–5-celled, rarely 1– or 10–20-celled, each cell with 1 or 2, rarely several ovules: fr. a caps., drupe or berry; seeds winged or not winged, albuminous or exalbuminous.—About 40 genera with 600 species in subtrop. and trop. regions, very few in temp. regions.

A. Lvs. odd-pinnate; lfts. 11–23: fls. small, whitish: fr. a caps.....1. *Cedrela*
AA. Lvs. twice-pinnate: fls. pale lilac, nearly 2 cm. across: fr. a drupe.....2. *Melia*

1. **CEDRÈLA** L. Deciduous or evergreen trees; buds subglobose, with several outer scales: lvs. alternate, usually abruptly pinnate, rarely odd-pinnate; fls. small, whitish or greenish, perfect, in large terminal or axillary panicles; calyx short, 4–5-parted; petals 4–5, keeled inside and adnate with the keel to the gynophore or disk; stamens 4–6, inserted at apex of gynophore, shorter than petals, with subulate filaments; ovary 5-celled on an elongated or short gynophore; style slightly exceeding the stamens, with capitate stigma; caps. with many winged seeds. (From *Cedrus;* the wood resembles that of the Cedar.) Including *Toona* Roem. About 18 species in trop. Am., S. E. Asia to Australia.

C. sinénsis Juss. Tree to 16 m., with shredding bark; brts. puberulous when young: lvs. long-petioled, 25–50 cm. long; lfts. 10–22, short-stalked, oblong to lance-oblong, 8–15 cm. long, acuminate, remotely and slightly serrate or nearly entire, light green beneath and pubescent on the veins or finally nearly glabrous: fls. white, fragrant, campanulate, about 5 mm. long, in pendulous panicles about 30 cm. long; 5 subulate staminodes alternating with the stamens; ovary glabrous, on a short gynophore: caps. obovoid, woody about 2.5 cm. long; seeds winged above. Fl.VI; fr.IX. R.H.1875:87; 1891:574. S.H.2:f.83b,84l-q. M.O.90. Gng.4:1(h). M.D.1902:495(h). G.C. III.72:138(h). (*Toona s.* Roem., *Ailanthus flavescens* Carr.) China. Intr. 1862. Zone V.—Ornamental tree with large feathery foliage, similar to Ailanthus but easily distinguished by the absence of the large gland-bearing teeth at the base of the lfts.

2. **MÈLIA** L. Deciduous or half-evergreen trees or shrubs; buds small, roundish with few outer scales, sometimes superposed: lvs. alternate, doubly pinnate, with entire or serrate lfts.: fls. conspicuous, perfect, in axillary panicles; calyx 5–6-parted, small, imbricate; petals 5–6, free, imbricate in bud; filaments connate into a slender tube, with 10–12 lobes at the apex and bearing 10–12 anthers between the lobes on the inside; ovary on a short disk, 5–8-celled, with a long cylindric style; each cell with 2 ovules: fr. a drupe, with fleshy outer coat. (Ancient Greek name of the Ash.) About 10 species in S. Asia and Austral.

M. Azédarach L. CHINA-TREE. Tree to 15 m. with furrowed bark: lvs. 25–80 cm. long; lfts. ovate to elliptic, 2–5 cm. long, acute, sharply serrate or lobed, light green, glabrous, or puberulous on veins and rachis when young: fls. lilac, nearly 2 cm. across, in loose panicles 10–20 cm. long; petals oblanceolate or narrow-oblong, spreading; ovary 5-celled; fr. subglobose, yellow, about 1.5 cm. across. Fl.IV–V; fr.IX–X. B.M.1066(c). S.I.2:t.35(c). E.N.III.4:f. 160A–L. (*M. japonica* Don.) Himal. Cult. since the 16th century; naturalized in all trop. and subtrop. countries. Zone VIII.—Var. **umbraculifórmis** Berckmans. TEXAS UMBRELLA-TREE. Brs. erect, crowded, forming a flattened head; lfts. narrower. G.F.7:95(h). F.E.26:187(h). Mn.8:73(h). B.C. 4:2024(h). (Var. *umbraculifera* Hort.) Orig. before 1860.

Fam. 46. **POLYGALACEAE** Reichenb. MILKWORT FAMILY.

Herbs, shrubs or small trees: lvs. usually alternate, simple, entire: fls. perfect, irregular; sepals 5, imbricate; the 2 inner ones larger and often petaloid; petals usually 3, rarely 5; stamens usually 8, the filaments connate into a tube or free; ovary superior, 2-celled; cells usually 1-ovuled: fr. a caps. nut or drupe.—About 10 genera with 500 species.

POLÝGALA L. Milkwort. Herbs, subshrubs or shrubs, rarely trees: lvs. alternate, rarely opposite, without or with reduced stipules: fls. usually in racemes, variously colored; sepals unequal; the 2 inner ones usually petaloid, wing-like; the lower petal clawed and adnate at base to the staminal tube; the 2 lateral petals usually wanting; stamens 8, very rarely fewer, connate into a tube, slit down to base and open behind; ovary 2-celled; cells 1-ovuled; style straight or curved: fr. a loculicidal caps. with 2 seeds; seeds usually ovoid or subglobose, usually with aril and usually albuminous. (Greek *polys*, much, and *gala*, milk; some species were formerly believed to increase the flow of milk.) About 450 species in both hemispheres, mostly herbaceous, the ligneous species chiefly subtrop.

P. Chamaebúxus L. Evergreen dwarf subshrub to 25 cm. high, creeping, with green glabrous or nearly glabrous brts.: lvs. alternate, lanceolate to elliptic or obovate, 1–2.5 cm. long, acutish, cuneate, dull green, coriaceous, glabrous: fls. 1 or 2, axillary or terminal, about 1.2 cm. long; the wings usually creamy white, the keel yellow or reddish near apex, 4-lobed at the dilated apex: caps. flat, suborbicular. Fl.iv–vi. B.M.3161(c). G.H.t.114(c). R.I. 18:t.150. F.D.16:t.1524(c). C. Eu. Cult. 1658. Zone V.—Var. **grandiflòra** Gaud. Fls. with purple or sometimes pink wings and yellowish keel. Gn.13: 36,t(c);30:148,t(c). R.I.18:t.150(c). F.D.16:t.1524(c). (Var. *purpurea* Neilr., var. *rhodoptera* Ball.)

Fam. 47. **EUPHORBIACEAE** Jaume St. Hil. SPURGE FAMILY.

Herbs, shrubs or trees, often with milky juice, very variable in habit: lvs. usually alternate, mostly stipulate: fls. unisexual, usually small, regular, rarely irregular; sepals and petals present, or the latter, rarely both, wanting, usually free; sepals valvate or imbricate; staminate fls. usually with intrastaminal disk and with 1 to many stamens; pistillate fls. with hypogynous disk; ovary usually 3-celled, rarely 1- or 2- or 4-20-celled; ovules 1 or 2 in each cell, pendulous: fr. usually capsular, separating into 3 parts, leaving a central column, rarely indehiscent and berry- or drupe-like; seeds albuminous.—More than 210 genera with about 4000 species mainly in the tropics, few ligneous species in temp. regions.

A. Fr. capsular, dehiscent: lvs. deciduous: fls. solitary or fascicled.
B. Fls. usually with petals: lvs. nearly rounded at base: subshrubs, not exceeding 1 m. 1. *Andrachne*
BB. Fls. apetalous; lvs. broad-cuneate at base: shrubs to 2 m. 2. *Securinega*
AA. Fr. a drupe: lvs. evergreen: fls. racemose. 3. *Daphniphyllum*

1. **ANDRÁCHNE** L. Low shrubs or subshrubs or perennial herbs; buds ovoid, with several outer ciliate scales: lvs. alternate, usually entire, with small stipules: fls. monoecious or incompletely dioecious, small, light yellowish green, 5–6-merous, the staminate in axillary clusters, the pistillate solitary; petals smaller than sepals; stamens not exceeding the sepals; the pistillate sometimes without petals; ovary 3-celled; styles 3, 2-cleft or 2-parted: fr. subglobose or depressed, separating into 3 2-valved carpels, 6-seeded. (Ancient Greek name.) Ten or 12 species in N. Am., Asia and Mal. Archip., Afr. —Low shrubs with bright green foliage; of slight ornamental value, occasionally grown in botanical collections.

A. phyllanthoìdes Muell. Arg. Upright shrub to 1 m., glabrous except the puberulous angled brts.: lvs. elliptic or obovate, 8–20 mm. long, obtuse or emarginate, often mucronulate at apex, rounded or broad-cuneate at base; petioles 1–2 cm. long: fls. 5–6 mm. across, on slender stalks 5–20 mm. long; sepals oblong-obovate; petals of staminate fls. narrow-obovate, little shorter

than sepals, 3–4-toothed, of pistillate fls. shorter, obovate, entire: fr. subglobose, about 8 mm. across, with the enlarged persistent sepals at base. Fl.VII–IX; fr.IX–X. (*A. Roemeriana* Muell. Arg.) Mo. to Ark. and Tex. Intr. 1899. Zone V.

Related species are: **A. cólchica** Fisch. & Mey. Dense shrub with slender brts. to **1 m.**, glabrous: lvs. ovate, 6–15 mm. long, obtuse, rounded at base; petals filiform, much shorter than sepals: fr. subglobose, about 5 mm. across. Asia Minor. Intr. before 1900. Zone V.—**A. cordifólia** Muell. Arg. Shrub to 1 m.: lvs. ovate to oblong, 2–5 cm. long, rounded, rarely cordate at base, soft-pubescent beneath; petals spatulate; caps. depressed-globose, about 6 mm. thick. Klotzsch & Garcke, Bot. Ergeb. Reise Prinz Wald.t.24. Himal. Intr. before 1910. Zone VI or VII.

2. **SECURÍNEGA** Juss. Deciduous shrubs; buds ovoid, with several outer scales: lvs. alternate, short-petioled, entire, stipulate; fls. dioecious or monoecious, small, greenish white, apetalous, axillary, the staminate fascicled, the pistillate 1 or several; sepals 5; stamens usually 5, longer than sepals, inserted at the base of an intrastaminal lobed disk entire in the pistillate fls.; ovary 3-celled; styles 3, 2-lobed; fr. a dehiscent subglobose caps. with persistent calyx at base, 3–6-seeded; embryo straight. (Name from Latin *securis*, hatchet, and *negare*, to refuse; referring to the hard wood of some species.) About 10 species in temp. and subtrop. regions of C. and S. Am., Asia, S. Eu. and Afr.—Shrubs of slight ornamental value, sometimes planted for their graceful habit and bright green foliage.

S. ramiflòra Muell. Arg. Shrub to 2 m., with slender spreading greenish brs., glabrous: lvs. short-stalked. elliptic or ovate to lance-ovate, 3–6 cm. long, acute or obtuse, cuneate, bright or yellowish green; petioles 2–4 mm. long; staminate fls. short-pediceled, about 3 mm. across, in 5–10-fld. clusters; pistillate solitary; caps. subglobose, about 5 mm. across, greenish, on slender stalks 1–1.5 cm. long. Fl.VII–VIII; fr.IX–X. K.D.352. S.H.2:f.86a-i. (*Geblera suffruticosa* Fisch. & Mey., *Flueggea s.* Baill., *Acidoton ramiflorus* Ktze.) Mong. to Amurl. and N. China. Intr. 1783. Zone V.

A closely related species is **S. flueggeoìdes** Muell. Arg. Brts. soon brownish or purplish: lvs. obtusish: pistillate fls. 2–5. J.C.20,3:t.1A. S.L.384(h). (*S. japonica* Miq.) Korea, Japan, N. and C. China. Intr. about 1905? Zone V.

DAPHNIPHÝLLUM Bl. Evergreen shrubs or small trees, glabrous; buds with several outer imbricate scales: lvs. alternate, petioled, entire, estipulate; fls. dioecious, small, apetalous, in axillary racemes; calyx small, 3–8-parted; stamens 5–18, with short filaments and large anthers; ovary 2-celled and 4-ovuled; styles 2, short, recurved: fr. a small oblong usually 1-seeded drupe; seeds with copious albumen and very small straight embryo at apex of seed. (Greek *daphne*, laurel, and *phyllon*, leaf; referring to the shape of the lvs.) About 25 species in E. Asia.

D. macrópodum Miq. Shrub or small tree, occasionally to 15 m. tall, of compact habit; brts. rather stout, green, glaucous and often reddish when young: lvs. oblong, 8–20 cm. long, acuminate, cuneate, dark green above, bluish white or sometimes green below, with 12–17 pairs of veins; petiole 3–4 cm. long, often red like the midrib; fls. pale green, in short racemes, about 2.5 cm. long: fr. oblong, about 1 cm. long, black. Fl.V–VI; fr.X–XI. S.I.1:t.54(c). E.P.IV.147a:10. Gn.48:259(h). S.L.179(h). Gs.2:7(h). (*D. glaucescens* Hort., not Bl.) Japan, Korea, China. Intr. 1879. Zone VI or VII.—Var. **variegàtum** Bean. Lvs. with broad irregular creamy white margin.—Ornamental shrub chiefly grown for its large handsome foliage.

A closely related species is **D. húmile** Maxim. Shrub to 1.5 m.: lvs. elliptic to obovate-oblong, 6–12 cm. long, acute, glaucescent beneath, with 11–14 pairs of

veins; petiole 1.5–2 cm. long. S.H.2:87g(l). (*D. macropodum* var. *h.* Rosenth., *D. macropodum* var. *jezoense* Nichols.) N. Japan. Intr. 1879. Zone VI?

Fam. 48. BUXACEAE Dum. BOX FAMILY

Evergreen shrubs or small trees: lvs. opposite or alternate, estipulate: fls. monoecious, small, apetalous, without hypogynous disk; calyx 4-parted or in the pistillate fls. 4–12-parted or wanting; stamens 4, opposite the sepals or numerous; anthers basifix; ovary superior, 3-celled, rarely 2–4-celled; ovules 2, collateral, rarely 1, pendulous: fr. a dehiscent caps. or fleshy; seeds albuminous.—Six genera with about 40 species in trop. and subtrop. regions, few in temp. countries.

A. Lvs. alternate, usually 3-nerved.
B. Lvs. entire: infl. subcapitate; styles short.....1. *Sarcococca*
BB. Lvs. dentate: infl. a spike; styles elongated: decumbent subshrubs.....2. *Pachysandra*
AA. Lvs. opposite, entire, penninerved: fr. capsular.....3. *Buxus*

1. **SARCOCÓCCA** Lindl. Evergreen glabrous shrubs; buds with several outer imbricate green scales: lvs. alternate, petioled, entire, usually penninerved, coriaceous: fls. whitish, apetalous in short axillary racemes or heads, with the pistillate fls. at base; sepals 4–6; staminate fls. with 4–6 stamens; pistillate fls. with a 2–3-celled ovary and with 2–3 erect or recurved styles; fr. drupe-like, subglobose to ellipsoid, coriaceous or fleshy, 1–2-seeded. (Name from Greek *sarkos*, flesh, and *kokkos*, berry; referring to the fleshy fr.) Five or 6 species from C. and W. China to Mal. Archipelago.—Ornamental shrubs, grown for their handsome evergreen foliage.

A. Lvs. ovate to elliptic-ovate: fr. dark scarlet.....1. *S. ruscifolia*
AA. Lvs. oblong-lanceolate to lanceolate: fr. black.....2. *S. Hookeriana*

1. **S. ruscifòlia** Stapf. Shrub to 2 m.; brts. puberulous when young: lvs. ovate or elliptic-ovate, 3–5 cm. long, acuminate, rounded or broad-cuneate at base, dark green and lustrous above, obscurely penninerved; petiole 3–5 mm. long: fls. white, fragrant, in few-, usually 4-fld. racemes: fr. subglobose, about 6 mm. across, dark scarlet. Fl.IX–II; fr.IX–XI. B.M.9045(c). Gn.83: 73, 127. C. and W. China. Intr. 1901. Zone VII?—Var. **chinénsis** Rehd. & Wils. Lvs. elliptic-ovate to lance-elliptic, 3.5–6 cm. long, cuneate. W. China. Intr.?

2. **S. Hookeriàna** Baill. Shrub to 2 m.; brts. puberulous when young: lvs. lance-oblong to narrow-lanceolate, 3–8 cm. long, acuminate, cuneate; petiole 6–8 cm. long; styles 3: fr. subglobose, 6 mm. across, black. Fl.X–III; fr.IX–XI. Gn.25:359. (*S. pruniformis* var. *Hookeriana* Hook.) W. Himal., Afghan. Cult. 1884. Zone VII?—Var. **dígyna** Franch. Styles 2. W. China. Intr. 1908.—Var. **húmilis** Rehd. & Wils. Shrub 0.3–1.5 m.: lvs. lanceolate to lance-oblong, 3–5 cm. long; midrib more prominent above; stamens less exserted; styles 2–3. (*S. h.* Stapf.) W. China. Intr. about 1907. Zone VI or (V).

A species of doubtful hardiness is **S. salígna** Muell. Arg. Brts. glabrous: lvs. lance-oblong or oblong-ovate, 5–12 cm. long, caudate-acuminate, 3-nerved at base: fr. ovoid, about 1 cm. long, purple. B.R.1012(c). I.T.3:t.90. (*S. pruniformis* Lindl.) Himal. Intr. 1820. Zone VIII?

2. **PACHYSÁNDRA** Michx. Evergreen or half-evergreen procumbent and ascending subshrubs with fleshy stems: lvs. alternate, dentate, 3-nerved at base: fls. white, in upright spikes, pistillate at base; staminate fls. with 4 sepals and 4 stamens and a rudimentary pistil; filaments thick, much longer than sepals, white; pistillate with 4 or more sepals; ovary 3-celled; cells 2-ovuled; styles 3, spreading: fr. a 3-horned caps. or drupe. (Name from

the Greek *pachys*, thick, and *aner*, *andros*, man; alluding to the thick filaments.) About 5 species in E. Asia and in E. N. Am.

P. terminàlis Sieb. & Zucc. Evergreen; ascending to 25 cm., stoloniferous, glabrous: lvs. obovate, 5–10 cm. long, cuneate, acutish, coarsely dentate, dark green and lustrous above: fl.-spike terminal, 3–5 cm. long: fr. whitish, ovoid, about 1 cm. long, 3-horned, berry-like. Fl.v. K.D.355. Ito, Icon. Pl. Jap. 1:t.2. S.L.33(h). H.B.3:92(h). Japan. Intr. 1882. Zone V.—Var. **variegàta** Manning. Lvs. variegated with white.—Ornamental low evergreen plant; useful as ground cover.

Less handsome is **P. procúmbens** Michx. Half-evergreen; slightly pubescent: vs. elliptic to obovate; spikes white or pinkish, to 12 cm. long, axillary at the base of the stem: B.M.1964(c). B.R.33(c). G.C.III.55:335. B.C.5:2426. W. Va. to Fla. Intr. 1800. Zone VI or V.

3. BUXUS L. Box. Evergreen shrubs or trees; buds with several outer scales: lvs. opposite, short-petioled, penninerved, entire, coriaceous, usually glabrous: fls. apetalous, in axillary or terminal clusters consisting usually of a terminal pistillate fl. and several staminate fls., the latter with 4 sepals and 4 stamens much longer than the sepals; pistillate fls. with 6 sepals and a 3-celled ovary with 3 short styles: fr. a subglobose or obovoid, 3-horned caps., separating into 3 2-horned valves, each with 2 lustrous seeds. (Ancient Latin name.) About 30 species in C. Eu., the Mediterr. region, in E. Asia and in the W. Indies and C. Am.

A. Lvs. elliptic to lance-oblong, broadest about or below the middle: brts. usually slightly pubescent.....1. *B. sempervirens*
AA. Lvs. obovate to oblong-obovate, broadest above the middle: brts. usually glabrous.....2. *B. microphylla*

1. B. sempérvirens L. Much-branched, dense shrub or tree to 6 or sometimes to 10 m.; brts. quadrangular, puberulous: lvs. elliptic or ovate to oblong, 1–3 cm. long, obtuse or emarginate at apex, dark green above, light or yellowish green beneath and lustrous on both sides: fls. in axillary clusters; staminate fls. sessile; the rudimentary pistil half as long as calyx; fr. about 8 mm. long. Fl.IV–V. R.I.5:t.153(c). F.D.20:t.2051(c). H.W.3:29. F.E.18:t.81(h). Gn.55:62(h). M.D.1920:t.9,10(h). S. Eu., N. Afr., W. Asia. Cult. since ancient times. Zone (V), VI.—Var. **arboréscens** L. Tall shrub or small tree; lvs. usually elliptic: the typical form.—Var. **péndula** Garden. Brs. pendulous. Orig. before 1876.—Var. **pyramidàta** Hartw. & Ruempl. Of upright pyramidal habit. (Var. *pyramidalis* Hort.)—Var. **argenteo-variegàta** West. Lvs. variegated with white. (Var. *argentea* Loud.)—Var. **aureo-variegàta** West. Lvs. variegated with yellow or entirely yellow. (Var. *aurea* Loud., var. *aureo-maculata* Baill.)—Var. **marginàta** Loud. Lvs. edged yellow. (Var. *aureo-limbo* West., var. *aurea marginata* Baill.)—Var. **glaùca** Kirchn. Lvs. oval, glaucous. (Var. *macrophylla glauca* Hort.)—Var. **rotundifòlia** Baill. Lvs. broad-oval. (Var. *latifolia* Hort.)—Var. **bullàta** Kirchn. Lvs. large, bullate.—Var. **myrtifòlia** Sweet. Usually low: lvs. small, elliptic-oblong. S.H.2:f.90u.—Var. **angustifòlia** West. Lvs. lance-oblong. S.H.2:f.90t. (*B. a.* Mill., var. *longifolia* Hort., var. *salicifolia* Hort.)—Var. **Handswórthii** K. Koch. Of upright habit with rather large dark green lvs.—Var. **rosmarinifòlia** Baill. Low: lvs. small, linear-oblong, revolute, 4–6 mm. wide. (Var. *thymifolia* Kirchn.)—Var. **suffruticòsa** L. EDGING BOX. Dwarf: lvs. small, oval or sometimes obovate: fl. clusters usually only terminal. Known for centuries and much used for edgings of flower beds. Zone V.—Ornamental shrub much planted for its handsome evergreen foliage.

A related species is **B. Wallichiàna** Baill. Shrub to 3 m.; brts. pubescent: lvs.

linear-lanceolate, 3–6 cm. long, acutish or obtusish, less glossy; petiole and midrib beneath puberulous. S.H.2:f.90h-i. Himal. Cult. 1880. Zone VII?

2. **B. microphýlla** Sieb. & Zucc. Compact shrub to 1 m. or sometimes prostrate, glabrous; stems sharply quadrangular: lvs. obovate to lance-obovate, 8–25 mm. long, rounded or emarginate, cuneate, fl.-clusters mostly terminal; staminate fls. with a rudimentary pistil about as long as calyx. Fl.v. K.D.355. J.C.20;3:t.6,f.C. S.H.2:f.90m-n(l). Japan. Intr. about 1860. Zone V or VI.—Var. **japónica** Rehd. & Wils. Shrub to 2 m., with spreading brs.: lvs. obovate or orbicular-obovate, 1–3 cm. long, rounded or emarginate, cuneate, light green; petiole glabrous: fl.-clusters axillary. J.C.20,3:t.6,f.c. S.H.2:f.89v-x,90o-p. (*B. j.* Muill. Arg., *B. sempervirens* var. *j.* Mak., *B. obcordata* Hort.) Japan. Intr. about 1860. Zone V.—Var. **koreàna** Nakai. Upright shrub to 0.6 m.; young brts. and petiole short-pilose: lvs. obovate or elliptic to oblong-elliptic, 6–15 mm. long, emarginate, pubescent on midrib above: fls. axillary and terminal. Korea. Intr. 1919. Zone V.—Var. **sínica** Rehd. & Wils. Brts. and the lower scales of winter-buds short-pilose: lvs. orbicular or obovate to elliptic-lanceolate, 8–35 mm. long, usually emarginate; petiole and midrib beneath toward the base puberulous. Kanehira, Formos. Trees, 476. China. Intr. about 1900. Zone VI? (?*B. Harlandii* var. *platyphylla* Schneid.)—This species with var. *japonica* and var. *koreana* are the hardiest of the Boxes.

It is doubtful, if the Chinese **B. Harlándii** Hance with oblanceolate to obovate-oblong lvs. 1.2–2 cm. long and 4–6 mm. broad and gradually narrowed toward the base, is in cult.; the plants seen in cult. under this name are either *B. microphylla* or *B. m.* var. *japonica.*

Fam. 49. **EMPETRACEAE** Dum. CROWBERRY FAMILY

Evergreen, small, ericoid shrubs: lvs. alternate, crowded, linear, deeply furrowed beneath, estipulate: fls. polygamous or dioecious, small, regular, apetalous; sepals 2–3, imbricate or sometimes wanting and replaced by bractlets, disk wanting; stamens 2–3: ovary superior, 2–9-celled; cells 2-ovuled; style 2–9-parted with lacinate or toothed stigmas: fr. drupaceous; seeds ascending, with the micropyle turned toward the outside, albuminous. Three genera with about 7 species in arctic and temp. regions of the n. hemisphere; in Am. s. to the Andes.

A. Fls. in terminal heads: fr. dry: small upright shrubs.....1. *Corema*
AA. Fls. solitary, axillary: fr. berry-like: procumbent shrubs.....2. *Empetrum*

1. **CORÈMA** Don. Evergreen upright shrubs; buds small, globose, with several outer scales: lvs. linear, often whorled: fls. dioecious, 3-merous, in terminal heads, each in the axil of a scale-like bract and with 5 or 6 imbricated bractlets at base, without calyx; stamens 3, rarely 4; style slender, with 3, rarely 4–5 narrow, often toothed stigmas: fr. a small drupe, with usually 3 nutlets. (Name from Greek *korema*, broom; referring to the bushy aspect of the plant.) Syn.: *Oakesia* Tuckerm., *Tuckermannia* Klotzsch. One species in E. N. Am. and one in W. Eu.

C. Conràdii Torr. Shrub 15–60 cm. tall, nearly glabrous: lvs. linear, 3–6 mm. long, obtuse, often in threes; staminate fls. with long exserted purple filaments and brown anthers: fr. very small, dry. Fls.IV–V. H.I.531. Mem. Am. Acad.II.3:t.1. Nfld. to N. J. Cult. 1885. Zone II or III.—Rarely cult.; attractive in spring with its purple staminate fls.

A related species **C. album** Don. Shrub to 60 cm.; brts. pubescent: lvs. linear, 6–10 mm. long, dark green: fls. inconspicuous; fr. white, berry-like, 6 mm. across, in clusters. S.H.2:f.92a-f. Portugal, Spain, Azores. Intr. 1774. Zone VII or VIII.

2. **ÉMPETRUM** L. Crowberry. Evergreen procumbent shrubs; buds small, globose, with few outer ciliate scales; lvs. linear-oblong, obtuse, crowded, thick: fls. dioecious or monoecious, axillary, with scale-like bracts at base; sepals 3, somewhat petaloid; stamens 3, with slender filaments; style very short, with 6–9 toothed stigmas: fr. a berry-like drupe with 6–9 nutlets. (Ancient Greek name, meaning "on rocks.") Five species in the arctic zone and extending on the higher mts. to the temp. regions, in Am. to antarctic S. Am.

E. nígrum L. Procumbent shrub ascending to 25 cm.; brts. glandular when young: lvs. linear to linear-oblong, 4–6 mm. long, glandular on margin when young, spreading and soon reflexed: fls. purplish; anthers pinkish: fr. black, about 5 mm. across. Fl.IV–V; fr.VIII–IX. R.I.5:t.158(c). F.D.21:t. 2108(c). S.E.8:t.1251(c). B.B.2:479. S.H.2:f.92g-o. N. Eu., N. Asia, in N. Am. s. to N. Y., Mich. and N. Calif. Intr. before 1700. Zone I.—Var. **purpúreum** DC. Fr. purple. E. Can. Intr.?—Ornamental shrub adapted for rockeries forming dense evergreen patches.

Closely related species are: **E. atropurpúreum** Fern. & Wieg.: lvs. linear-oblong, loosely divergent, on the margin white-tomentose as are the brts.: fr. red to purplish black, 5–7 mm. across. (*E. nigrum* var. *purpureum* Auth., not DC., var. *tomentosum* Hort.) Gulf St. Lawrence to Me. and N. H. Cult. 1890.—**E. Eamèsii** Fern. & Wieg. Lvs. linear-oblong, 3–4 mm. long, ascending, becoming slightly divergent, white-tomentose on the margin as are the brts.: fr. pink or light red, becoming translucent, 4–5 mm. across. (*E. nigrum* var. *purpureum* Auth., not DC.) S. Lab., Nfdl. and Que. Intr. 1925. Zone I.

Fam. 50. **CORIARIACEAE** Lem. CORIARIA FAMILY

Shrubs or herbs with angular glabrous brts.: lvs. opposite or whorled, ovate to lanceolate, entire, estipulate: fls. perfect or polygamous, regular, small, greenish, axillary or in racemes; sepals 5, imbricate; petals 5, smaller, enlarging, becoming fleshy and enclosing the fr.; stamens 10, with short filaments: ovary superior, of 5–10 separate carpels; each with one pendulous ovule; styles free, filiform, papillose throughout: fr. berry-like; the indehiscent 1-seeded dry fruitlets enclosed by the fleshy petals; seed compressed, albuminous. One genus.

CORIÀRIA L. Characters of the family. (Name from Latin *coriarius*, pertaining to leather; referring to the use of the plant for tanning.)

A. Infl. lateral on last year's brts.: lvs. 3-nerved glabrous.....1. *C. japonica*
AA. Infl. terminal, 10–20 cm. long: lvs. 5–9-nerved.....2. *C. terminalis*

1. **C. japónica** Gray. Shrub usually to 1, rarely to 3 m.: lvs. subsessile, ovate to lance-ovate, 3–10 cm. long, acuminate, 3-nerved, bright green: fls. small, greenish or reddish in racemes 2–3 together and 3–6 cm. long; staminate racemes shorter, drooping: fr. depressed-globose, about 5 mm. across; first bright red, changing to violet-black. Fl.v; fr.VIII–IX. B.M.7509(c). S.I.2:t.58(c). G.F.10:343. B.C.2:846. R.H.1913:79. S.L.158(h). Japan. Intr. 1892. Zone (V), VI.—Ornamental shrub with bright green lvs. and conspicuous fr. in autumn.

Closely related species are: **C. sínica** Maxim. Shrub to 6 m.: lvs. elliptic or broad-elliptic, 3–7 cm. long, abruptly short-pointed: fr. black. S.H.2:f.94e(l). C. and W. China. Intr. about 1895. Zone VI? or VII.—**C. myrtifólia** L. Shrub to 3 m.: lvs. ovate, 2.5–6 cm. long, acute, grayish green: fls. greenish, in racemes about 2.5 cm. long: fr. black, about 6 mm. across. R.I.5:t.160(c). E.N.III.4: f.81. S.H.2:f.93. S. Eu., N. W. Afr. Intr. 1629. Zone VIII.

2. **C. terminàlis** Hemsl. Herbaceous or suffruticose to 1 m.; brts. scabrid when young: lvs. subsessile, broad-ovate to lance-ovate, 2.5–7 cm. long, abruptly acuminate: fls. greenish in terminal racemes 12–22 cm. long: fr. black. Fl.VI;

fr.VIII. H.I.2220. Sikkim to W. China. Intr. 1908. Zone VII?—Var. **xanthocárpa** Rehd. & Wils. Fr. yellow. B.M.8525(c). R.H.1907:160,t(c). M.D.1897:1,t(c), 62(h). G.C.III.34:282. Sikkim. Cult. 1895. Zone VI.—Particularly the var. is very ornamental with its long spikes of yellow translucent berries.

Fam. 51. **ANACARDIACEAE** Lindl. CASHEW FAMILY

Deciduous or evergreen trees or shrubs with resinous bark: lvs. alternate, very rarely opposite, simple or compound, estipulate or very rarely stipulate: fls. perfect or unisexual, regular, small, in panicles, perigynous, epigynous or hypogynous; sepals 3–5; petals 3–5 usually imbricate, or wanting; stamens 5 or 10, rarely more, inserted with the petals at the edge of an annular disk; carpels 1 or 3–5, free or united, 1-ovuled; ovules anatropous; styles 1–5: fr. a drupe or nut, rarely dehiscent; seeds usually exalbuminous or with very thin albumen; embryo curved.—About 60 genera with 400 species chiefly in the trop. and subtrop. zones of both hemispheres.

A. Fls. apetalous: lvs. abruptly pinnate with 10–12 entire lfts.....1. *Pistacia*
AA. Fls. with petals.
B. Lvs. simple, obtuse: fruiting panicle with long plumose sterile pedicels....2. *Cotinus*
BB. Lvs. odd-pinnate or ternate; fruiting panicle without plumose pedicels.....3. *Rhus*

1. **PISTÁCIA** L. Evergreen or deciduous trees or shrubs; buds with several outer scales: lvs. simple, ternate or pinnate: fls. dioecious, apetalous or naked, in lateral panicles; staminate fls. with 2 bractlets at base and 1–2 sepals and with 3–5 stamens with short filaments; pistillate fls. with 2 bractlets, 2–5 sepals and a superior subglobose or ovoid, 1-ovuled ovary; style short, 3-parted: fr. a dry, obliquely ovoid drupe; seed compressed; embryo with plan-convex cotyledons. (Ancient Greek name *pistake*, Latin *pistacia*.) Eight species in the Mediterr. Reg., Mex., Tex. and E. Asia.

P. chinénsis Bge. Deciduous tree to 25 m.; brts. puberulous: lvs. abruptly pinnate; lfts. 10–12, short-stalked, lanceolate, 5–9 cm. long, acuminate, oblique, puberulous when young, soon glabrous or nearly so; petiole puberulous: fls. small, the staminate ones in dense panicles 5–8 cm. long, pistillate fls. in longer and looser panicles: fr. globose-obovoid, 5–6 mm. across, compressed, red, finally purple, in much-compound panicles 15–24 cm. long. Fl. IV; fr.X–XI. C.C.118. Kew Bull. 1910:393,t(h). M.G.27:25(h). U.S.Im.109: t(h);117:t(h). China. Intr. about 1890. Zone VII?—Ornamental tree with graceful foliage turning crimson in autumn; sometimes planted as shade-tree in the S. and used as stock for the pistachio.

2. **CÓTINUS** Adans. Deciduous shrubs or trees with yellow wood and a strong-smelling juice: lvs. alternate, slender-petioled, entire; buds with several imbricate dark red-brown scales: fls. polygamous, yellowish, in large and loose terminal panicles; petals 5, oblong, twice as long as the lance-ovate sepals; stamens shorter than petals; ovary superior with 3 short lateral styles: the fruiting panicles with the pedicels of the numerous sterile fls. lengthened and plumose: fr. a small, dry, obliquely obovoid drupe; embryo with flat cotyledons. (Ancient Greek name of the wild olive.)—One species in N. Am. and one from S. Eu. to C. China.

A. Lvs. abruptly contracted at base, generally oval.....1. *C. Coggygria*
AA. Lvs. cuneate, generally obovate.....2. *C. americanus*

1. **C. coggýgria** Scop. SMOKE-TREE. Shrub of round bushy habit, to 5 m., often broader than high: lvs. oval to obovate, 3–8 cm. long, rounded or slightly emarginate at apex, glabrous; petiole 1–4 cm. long: fls. about 3 mm. across, polygamous: fruiting panicle 15–20 cm. long with numerous sterile pedicels furnished with long spreading purplish or greenish hairs and

with few kidney-shaped reticulate frs. 3–4 mm. across. Fl.VI–VII; fr.VIII–IX. (*C. Cotinus* Sarg., *C. coccygea* K. Koch, *Rhus Cotinus* L.) F.D.21:t.2174(c). G.H.t.30(c). B.C.2:864. G.C.III.29:92,t(h);72:247(h). Gn.78:606(h). Gng. 5:118(h). S.L.t.12(hc). S. Eu. to C. China and Himal. Cult. 1656. Zone V.—Var. **purpúreus** Rehd. Panicle with intensely purple hairs; young lvs. purplish. Cult. 1870. (*C. C.* var. *atropurpurea* Dipp.)—Var. **péndulus** Dipp. Brs. pendulous. R.B.11:257(h). Cult. before 1885.—Ornamental shrub chiefly cult. for the peculiar filmy effect of the plumose fruiting panicles and for the yellow and purple autumn tints of the lvs.

2. **C. americânus** Nutt. Upright shrub or small tree to 10 or 12 m.: lvs. obovate to elliptic-obovate, 6–12 cm. long, rounded at apex, silky-pubescent beneath when young; petiole 1.5–3.5 cm. long: fls. dioecious: fruiting panicle 10–15 cm. long with rather inconspicuous pale purplish or brownish hairs on the sterile pedicels and sparingly produced frs. about 3 mm. across. Fl.VI–VII; fr.VIII–IX. N.S.2:t.81(c). S.S.3:t.98,99. Gn.89:642(h). (*C. cotinoides* Brit., *Rhus cotinoides* Nutt., *R. americana* Nutt.) Ala. to E. Tenn. and W. Tex. Intr. 1882. Zone V or VI.—Ornamental shrub chiefly grown for its brilliant scarlet and orange autumn tints of its lvs.; the fruiting panicles are not showy.

3. **RHUS** L. Sumac. Deciduous or evergreen shrubs, sometimes climbing, or trees; buds small, roundish, naked: lvs. alternate, odd-pinnate, 3-foliolate or simple: fls. small, dioecious or polygamous, in axillary or terminal panicles; petals 5, imbricate, longer than the 5-parted imbricate calyx; stamens 5, inserted below a brownish disk: ovary superior with 1 ovule and 3 terminal styles usually free: fr. a globose or compressed drupe with thin exocarp, resinous mesocarp and bony or crustaceous endocarp; embryo with flat cotyledons. (Ancient Greek name.) Including *Schmaltzia* Desv. and *Toxicodendron* Mill. About 150 species in subtrop. and temp. regions of both hemispheres.

A. Lvs. pinnate.
  B. Infl. terminal: fr. red, hairy.
    C. Fruiting panicle upright: lfts. serrate (usually entire in No. 4).
      D. Rachis terete or winged below the terminal lfts. in No. 5.
        E. Lfts. glabrous beneath or pubescent on the veins, glaucous.
          F. Brts. glabrous, glaucous: infl. finely pubescent ..... 1. *R. glabra*
          FF. Brts. and infl. densely pilose ..... 2. *R. typhina*
        EE. Lfts. densely brownish pubescent beneath: low shrub to 1 m. ... 3 *R. Michauxii*
      DD. Rachis winged.
        E. Lfts. entire or with few teeth toward the apex, 9–21 ..... 4. *R. copallina*
        EE. Lfts. coarsely serrate, usually rounded at base, 7–13 ..... 5. *R. javanica*
    CC. Fruiting panicles pendulous: lfts. entire, only in young plants sometimes serrate; rachis not or slightly winged only on the upper part.
      D. Brts. puberulous: lfts.7–13, subsessile or sessile, pubescent on veins beneath. 6. *R. punjabensis*
      DD. Brts. glabrous: lfts. 5–9, nearly glabrous, distinctly stalked ..... 7. *R. Potanini*
  BB. Infl. axillary: lfts. entire; lvs. crowded at end of brts.: fr. whitish.
    C. Frs. hispid: lfts. pubescent beneath, 13–17, 4–10 cm. long ..... 8. *R. trichocarpa*
    CC. Fr. glabrous: lfts. 7–15.
      D. Lfts. pubescent beneath at least on the veins, usually rounded at base: brts. pubescent at least when young.
        E. Lfts. to 16 cm. long and to 7 cm. broad, not closely veined, the distance between the veins more than 5 mm. ..... 9. *R. verniciflua*
        EE. Lfts. to 12 cm. long and to 4 cm. broad, closely veined, the veins 5 mm. or less distant ..... 10. *R. sylvestris*
      DD. Lvs. glabrous and glaucous beneath, sometimes pubescent when young, cuneate at base; brts. and petioles glabrous ..... 11. *R. vernix*
AA. Lvs. ternate.
  B. Fls. in loose axillary panicles: fr. glabrous, white: lfts. 3–16 cm. long, usually glabrous. 12. *R. Toxicodendron*
  BB. Fls. in short and dense panicled spikes, catkin-like before opening: fr. red, pubescent: lfts. 1.5–7 cm. long.
    C. Lfts. pubescent, 2.5–7 cm. long, crenate-serrate ..... 13. *R. canadensis*
    CC. Lfts. glabrate, 1.5–2.5 cm. long, with few rounded teeth or lobed ..... 14. *R. trilobata*

Sect. 1. Sumac DC. Fls. in terminal panicles, polygamous: frs. densely pubescent, red: lvs. pinnate.

1. **R. glábra** L. Smooth S. Shrub to 3 or sometimes to 5 m.; brts. glabrous and glaucous: lfts. 11–31, lance-oblong, 5–12 cm. long, acuminate, serrate, glaucous beneath: fls. greenish, in dense panicles 10–25 cm. long, puberulous: fr. scarlet, viscid-pubescent, in dense panicles. Fl.vii–viii; fr.viii–ix (–iv). Em.572,t(c). M.A.1:36(c). F.E.30:681(h). M.D.1906:t.9(h). S.L 353(h). (*Schmaltzia g.* Small.) Me. to B. C., s. to Fla. and Ariz. Cult. 1726 Zone II.—Var. **laciniàta** Carr. Lfts. pinnately dissected. F.E.31:875(h). Gn.54:507(h). R.H.1863:7(h). Cult. 1863. Zone VI.—Ornamental shrub chiefly valued for the bright red autumnal foliage and the scarlet fruiting panicles.

2. **R. typhìna** L. Staghorn S. Shrub or small tree to 10 m.; brts. densely velvety-hairy: lfts. 11–13, lance-oblong, 5–12 cm. long, acuminate, serrate, glaucous beneath, pubescent when young: fls. greenish, in dense hairy panicles 10–20 cm. long: fr. crimson, densely hairy. Fl.vi–vii; fr.viii–ix(–iv). Em. 571,t. S.S.3:102, 103. Gn.54:505(h). G.F.2:343(h). M.D.1906:t.8(h). (*R. hirta* Sudw., *Schmaltzia h.* Small.) Que. to Ont., s. to Ga., Ind. and Iowa. Cult. 1629. Zone IV.—Var. **laciniàta** Wood. Lfts. and bracts deeply and lacinately toothed and infl., sometimes partly transformed into contorted bracts. Cult.?—Var. **dissécta** Rehd. Lfts. pinnately dissected. M.G.15. 211(h). G.M.53:827(h). R.H.1907:10,11(h). S.L.353(h). (Var. *laciniata* Manning, not Wood.) Cult. 1898.—Ornamental shrub chiefly grown for its feathery foliage turning early in autumn to brilliant scarlet and orange and for the crimson fruit-clusters.

R. t. × *glabra* = R. **hýbrida** Rehd. Intermediate between the parents. Occasionally found wild. Intr. 1923.

3. **R. Michaûxii** Sarg. Low stoloniferous shrub to 1 m.; stems densely hairy: lfts. 9–15, ovate to oblong-ovate, 5–10 cm. long, acuminate, coarsely serrate, pubescent above, densely brownish pubescent beneath; rachis winged below the terminal lfts.: fls. greenish yellow in panicles 10–20 cm. long: fr. compressed, scarlet, densely hairy, in dense panicles. Fl.vi–vii; fr.viii–ix. G.F.8:405. (*Schmaltzia M.* Small, *R. pumila* Michx., not Meerb.) N. C. to Ga. Intr. 1806. Zone V.

4. **R. copallìna** L. Shining S. Shrub or small tree, occasionally to 10 m.; brts. reddish, puberulous: lfts. 9–21, oblong-ovate to lance-ovate, 4–10 cm. long, usually acute, entire or sometimes with a few teeth near the apex, glabrous and lustrous above, usually pubescent beneath; rachis winged, pubescent: fls. greenish, in dense panicles: fr. hairy, crimson. Fl.vii–viii; fr.ix–x. S.S.3:t.104, 105. K.S.81. (*Schmaltzia c.* Small.) Me. and Ont. to Minn., s. to Fla. and Tex. Cult. 1688. Zone IV.—Ornamental shrub planted for its lustrous foliage changing to reddish purple in autumn and for the crimson fr.-clusters.

5. **R. javánica** L. Large shrub or small tree to 8 m., with broad round head: brts. yellowish, glabrous: lfts. 7–13, subsessile, ovate to ovate-oblong, 6–12 cm. long, acute or short-acuminate, coarsely crenate-serrate, brownish pubescent beneath; rachis and often the petiole conspicuously winged, pubescent: fls. creamy-white, in broad panicles 15–25 cm. long: fr. subglobose, orange-red, densely pubescent. Fl.viii–ix; fr.x. S.I.1:t.58(c). B.C.5:2953. R.H.1867:111. M.G.14:166(h). S.L.354(h). (*R. Osbeckii* Dene., *R. semialata* Murr., *R. semialata* var. *Osbeckii* DC.) China, Japan, Sandwich Isls. Cult. 1784. Zone V.—Var. **Roxbúrghii** Rehd. & Wils. Rachis not or slightly

winged. Himal. Intr. ? Zone VII?—Ornamental small tree chiefly valued for its large creamy white fl.-clusters late in summer.

6. **R. punjabénsis** Stew. var. **sínica** Rehd. & Wils. Tree to 12 m.; brts. short-pubescent: lfts. 7–11, sessile, ovate-oblong to oblong, 8–12 cm. long, acuminate, rounded to subcordate at the base, entire, pubescent on the veins beneath; upper part of rachis narrowly winged, or on young plants sometimes winged the whole length and lfts. up to 17: fls. whitish in pubescent panicles 12–20 cm. long, with spreading brs.; anthers purple: fr. suborbicular, 4–5 mm. across, red, densely hairy, in drooping panicles. Fls.VI–VII; fr.IX–X. (*R. sinica* Diels, *R. coriarioides* Dipp.) C. and W. China. Cult. 1890. Zone (V).—Ornamental tree with handsome foliage and large pendulous panicles of red fr.

7. **R. Potanini** Maxim. Tree to 8 m.; brts. glabrous or minutely pubescent: lfts. 7–9, subsessile or short-stalked, oblong-ovate to oblong-lanceolate, 6–12 cm. long, acuminate, broad-cuneate or rounded at base, entire or on young plants sometimes coarsely toothed, slightly pubescent on the veins beneath or nearly glabrous; rachis terete or sometimes slightly winged between the upper lfts.: fls. whitish, in puberulous panicles 10–20 cm. long; anthers yellowish: fr. dark red, densely hairy, in pendulous panicles. Fl.V–VI; fr.IX. M.D. 1910:103. G.M.51:419;52:721. (*R. sinica* Koehne, not Diels, *R. Henryi* Diels.) C. and W. China. Cult. 1902. Zone (V).—Ornamental tree similar to the preceding.

Sect. 2. TOXICODENDRON Gray. Fls. in axillary panicles, polygamous: fr. whitish to brownish, glabrous or hispid: lvs. pinnate or ternate.

8. **R. trichocárpa** Miq. Tree to 8 m.; young brts. pubescent: lfts. 13–17, short-stalked, ovate to oblong, 4–10 cm. long, acuminate, rounded at base, pubescent beneath and sometimes above, with 10–16 pairs of veins; rachis terete, pubescent: fls. in axillary slender puberulous panicles with the stalk 6–15 cm. long: fr. slightly compressed, hispid, about 6 mm. across, yellowish, the hispid exocarp soon separating and falling off, exposing the white mesocarp. Fls.VI; fr.VIII. G.F.10:384. Japan, China. Intr. 1890. Zone V.—Ornamental tree with handsome foliage changing orange and scarlet in autumn; petioles of young lvs. bright red.

9. **R. vernicíflua** Stokes. VARNISH-TREE. Tree to 20 m.; brts. pubescent when young, later glabrous and light yellowish gray or gray, lenticellate: lfts. ovate to oblong-ovate, stalked, 7–20 cm. long and 3–7 cm. broad, acuminate, rounded to broad-cuneate at base, entire, pubescent beneath when young, at maturity at least along the midrib, with 8–16 pairs of veins; rachis terete: fls. yellowish white, in loose drooping panicles 15–25 cm. long: fr. compressed, broader than high, 6–8 mm. across, straw-yellow. Fl.VI; fr.IX. S.I.1:t.57(c). I.T.6:t.201. Gn.34:158;54:507. G.W.1:95(h),97. M.D.21:t. 12(h). S.L.352(h). (*R. vernicifera* DC., *R. vernix* Thunb., not L.—Lacquer-tree.) Japan, China, Himal. Cult. 1874. Zone V.—Ornamental tree planted for its large foliage and the conspicuous pendulous fruiting panicles; in Japan and China it yields the famous varnish or lacquer of Japan; the oil expressed from the fr. is used for candle-making. The tree is poisonous.

10. **R. sylvéstris** Sieb. & Zucc. Tree to 10 m.; brts. short-pilose: lfts. 7–13, short-stalked, ovate to ovate-oblong, 4–10 cm. long, acuminate, rounded to broad-cuneate at base, pubescent above or nearly glabrous, pubescent beneath or at least densely, rarely slightly on the veins, with 18–25 pairs of conspicuous veins; petiole usually short-pilose: fls. in loose panicles 8–18 cm. long, with spreading brs., usually brownish pubescent: fr. brownish yellow,

broader than high and very oblique, about 1 cm. across. Fl.VI; fr.IX–X. S.I.1:58(c). S.H.2:f.99x-x⁴,100a. China, Japan, Korea. Intr. 1881. Zone VI.—Ornamental tree with handsome foliage turning deep red or scarlet in autumn.

11. **R. vérnix** L. POISON S. Shrub or small tree to 7 m.; brts. glabrous, glaucous at first, gray at maturity: lfts. 7–13, short-stalked, elliptic to elliptic-oblong, 4–10 cm. long, acuminate, cuneate, entire, slightly pubescent at first, becoming quite glabrous, with 8–12 pairs of veins; petioles glabrous: fls. greenish yellow, in slender panicles 8–20 cm. long: fr. subglobose, compressed, 5–6 mm. across, light yellowish gray. Fl.VI–VII; fr.IX. Em.575,t(c). M.A.1:t.37(c). S.S.3:t.107, 108. (*R. venenata* DC.) R. I. and Ont. to Minn., s. to Fla. and La. Cult. 1713. Zone IV.—Ornamental shrub with orange and scarlet foliage in autumn, but little planted on account of its highly poisonous properties.

Related species are: **R. succedànea** L. WAX-TREE. Tree to 10 m.: lfts. 9–15, elliptic-oblong to oblong-lanceolate, 6–12 cm. long, long-acuminate, lustrous above, grayish green or glaucescent beneath, glabrous, with 12–20 pairs of veins: fr. 7–9 mm. across. S.I.1:57(c). R.H.1863:130. S.H.2:f.99y-z²,100b. China, Japan, Himal. Cult. 1863. Zone VII? or VIII.—**R. Delavaÿi** Franch. Glabrous shrub: lfts. 5–7, elliptic, 3–5 cm. long, light green beneath: infl. 5–8 cm. long. S.H.2:f.100c(l).—Var. **quinquéjuga** Rehd. & Wils. Lfts. 5–11, slightly pubescent when young. W. China. Intr. 1908. Zone VI or VII.

12. **R. Toxicodéndron** L. POISON IVY. Suberect, scrambling over walls and fences or high climbing by aërial rootlets; brts. sparingly pubescent or glabrate: lfts. 3, ovate or rhombic, 3–12 cm. long, acute or short-acuminate, entire or sparingly and coarsely dentate or sinuate, paler and more or less pubescent beneath, the lateral ones short-stalked, the terminal one on a stalk 1–3 cm. long; petiole 5–10 cm. long: fls. greenish white, in panicles 3–6 cm. long: fr. subglobose, 5–6 mm. across, whitish or yellowish. Fl.VI–VII; fr.X(–III). B.M.1806(c). M.A.1:t.38(c). Em.577,t(c). F.D.21:t.2175(c). (*Toxicodendron vulgare* Mill.—Poison Oak.) N. S. to Fla., w. to Minn., Neb. and Ark. Cult. 1640. Zone IV or III.—Var. **radìcans** Torr. High climbing with aërial rootlets. (*R. r.* L.) S.L.351(h). M.D.1906:t.11(h).—Very showy in autumn with the brilliant scarlet and orange tints of its foliage; poisonous.

Related species, all poisonous, are: **R. quercifòlia** Steud. Upright to 0.5 m.: lfts. broadly rhombic-ovate, 3–7-lobed, pubescent beneath, rather firm: fr. pubescent at first, papillose at maturity. N. C. to Fla. and Tex. Intr. ?—**R. diversíloba** Torr. & Gray. Upright shrub or sometimes climbing: lfts. ovate-elliptic or obovate, 3–7 cm. long, usually obtuse, coarsely crenate-serrate or 3-lobed. B.R. 31:38(c). Zoe,1:t.4. S.H.2:f.98d,99q. B. C. to Calif. Cult. 1845. Zone VI or VII.—**R. orientàlis** Schneid. Climbing; brts. pubescent when young: lfts. dull green above, always entire, glabrous beneath except axillary tufts of hairs: fr. pilose (*R. Toxicodendron* var. *hispida* Engl., *Ampelopsis Hoggii* and *A. japonica* Hort.) Japan, China. Intr. about 1865. Zone V.

Sect. 3. LOBADIUM DC. Fls. in short, solitary or clustered spikes, catkin-like before opening, polygamo-dioecious, before the lvs.: fr. red, pubescent: lvs. ternate.

13. **R. canadénsis** Marsh. FRAGRANT S. Usually prostrate shrub to 1 m., with ascending or diffuse brs., aromatically fragrant; brts. pubescent: lfts. 3, subsessile, ovate, 2.5–7 cm. long, acute or acuminate, crenate-serrate, pubescent, the terminal one cuneate and often obovate, the lateral ones oblique and rounded at base: fls. yellowish, in solitary or clustered spikes 5–20 mm. long, forming short panicles at the end of the brts.: fr. subglobose, about 6 mm. across, red, hairy. Fls.III–IV; fr.VIII. M.A.1:t.39(c). B.B.2:482. K.S.89. S.L.350(h). (*R. aromatica* Ait., *Schmaltzia a.* Desv.) Vt. and Ont. to Minn., s. to Fla. and La. Intr. 1759. Zone IV.—Ornamental shrub, rather

conspicuous in early spring with its yellow fls.; lvs. turning orange and scarlet in autumn.

14. **R. trilobàta** Nutt. Ill-scented S. Upright or ascending shrub to 1, rarely 2 m., ill-scented: brts. pubescent: lfts. 3, sessile or subsessile, elliptic or obovate, 1.5–2.5 cm. long, cuneate, with few rounded teeth, the terminal one usually 3-lobed, slightly pubescent when young, soon glabrate: fls. and frs. similar to those of the preceding species, except fls. greenish and frs. slightly smaller. Fls.III–IV; fr.VIII. B.B.2:483. K.S.91. (*R. canadensis* var. *t.* Gray, *Schmaltzia t.* Small.) Ill. to Wash., Calif. and Tex. Intr. 1877. Zone V.—Ornamental shrub; fls. less conspicuous than those of *R. canadensis* and habit more upright.

Fam. 52. CYRILLACEAE Lindl. CYRILLA FAMILY

Shrubs or small trees: lvs. alternate, entire, estipulate: fls. perfect, regular, small, in racemes; sepals 5, imbricate, often enlarged in fr.; petals 5, imbricate; stamens 5 or 10, hypogynous, with dilated filaments; ovary superior, 2–4-celled, each cell with 1–4 pendulous ovules; style short, with 2–4 stigmas: fr. dehiscent or indehiscent and angled or winged; seeds albuminous with small straight embryo. Three genera in N. and S. Am.

A. Racemes axillary; stamens 5: fr. ovoid.....1. *Cyrilla*
AA. Racemes terminal; stamens 10: fr. 3–4-winged.....2. *Cliftonia*

1. **CYRÍLLA** Gard. Deciduous to evergreen shrub or small tree; buds small, with several loose pointed scales: lvs. short-petioled, glabrous: fls. white, in narrow slender axillary racemes; petals 5, lance-oblong, about twice as long as sepals; stamens 5, shorter than petals; ovary usually 2-celled, each cell with usually 2 ovules: fr. a 2-celled loculicidally dehiscent capsule; seeds elongated, acuminate. (After Dominico Cirillo, professor of medicine at Naples; 1734–1799.) One species.

C. racemiflòra L. Leatherwood. Shrub or tree to 10 m., glabrous: lvs. oblong or oblanceolate, 4–8 cm. long, usually obtuse, cuneate, lustrous above, reticulate beneath, bright green: fls. white, 4–5 mm. broad, in slender racemes 8–15 cm. long, pendulous in fr.; fr. about 2 mm. long. Fl.VI–VII; fr.VIII–IX. B.M.2456(c). S.S.2:t.51. G.C.III.30:198. E.N.III.5:f.112a-c. Va. to Fla., also W. Ind. and E. S. Am. Intr. 1767. Zone VI or VII.—Ornamental shrub, grown for its graceful racemes of white fls. and for the handsome bright green foliage turning to orange and scarlet late in autumn in the hardier deciduous form.

2. **CLIFTÒNIA** Banks. Evergreen shrub or small tree, glabrous; buds ovoid, with about 2 scales: lvs. short-petioled: fls. in terminal racemes; petals 5, rarely 6–8, obovate, much longer than sepals; stamens 10, shorter than petals; ovary superior, 3–4-celled, each cell with 1 pendulous ovule; stigma 3–4-lobed, subsessile: fr. ovoid, indehiscent 3–4-winged. (After Dr. Francis Clifton, an English physician; d. 1736.) One species.

C. monophýlla Sarg. Buckwheat-tree. Shrub or tree, occasionally to 15 m.; lvs. lance-oblong, 3–5 cm. long, obtuse, cuneate, dark green above: fls. white or pinkish, about 8 mm. across, fragrant, in racemes 3–6 cm. long: fr. about 6 mm. long. Fl.III–IV; fr.VIII–IX. B.M.1625(c). S.S.2:t.52. (*C. ligustrina* Spreng., *C. nitida* Gaertn.) Ga. to Fla. and La. Intr. about 1806. Zone VII or VIII.—Ornamental shrub with early fragrant fls. and attractive buckwheat-like fr.

Fam. 53. AQUIFOLIACEAE DC. HOLLY FAMILY

Trees or shrubs: lvs. alternate, simple, often evergreen; stipules minute, caducous: fls. regular, usually dioecious, small, axillary; sepals 3–6, more or less connate; petals 4–5, rarely more, imbricate; stamens 4–5; disk wanting; ovary superior, 3–many-celled, each cell with 1–2 pendulous ovules; stigma subsessile, lobed: fr. a berry-like drupe; seed with a very small embryo at the apex of the copious albumen.—Three genera with more than 300 species in the temp. and trop. regions of both hemispheres.

A. Petals broad, cohering at base; sepals persistent.....1. *Ilex*
AA. Petals linear, free; sepals minute, deciduous: lvs. entire, deciduous: fr. slender-stalked. 2. *Nemopanthus*

1. ÎLEX L. Holly. Evergreen or deciduous shrubs or trees; buds small, ovoid, with about 3 outer scales: lvs. petioled, entire or serrate, often with spiny teeth: fls. dioecious or polygamous, axillary, solitary or fascicled or in cymes, usually 4-merous or 5–8-merous; fr. a berry-like drupe, with 2–8 bony 1-seeded nutlets. (Ancient Latin name of *Quercus Ilex.*) About 300 species in the temp. and trop. regions of both hemispheres.

Lvs. evergreen
A. Fls. and frs. axillary on last year's brts., usually clustered.
B. Lvs. with spiny usually coarse teeth or occasionally entire, but with spiny apex.
C. Fls. and frs. stalked: lvs. 3–11 cm. long.
D. Lvs. ovate or elliptic to lanceolate.....1. *I. Aquifolium*
DD. Lvs. rectangular-oblong and 3-pointed at apex.....2. *I. cornuta*
CC. Fls. and frs. subsessile.
D. Lvs. 1.5–4 cm. long, with few strong teeth: fr. 4-seeded.....3. *I. Pernyi*
DD. Lvs. 5–10 cm. long, spinose-serrate: fr. usually 2-seeded.....4. *I. dipyrena*
BB. Lvs. serrate, crenate or entire and obtusely pointed.
C. Lvs. entire, 5–8 cm. long.....5. *I. integra*
CC. Lvs. serrate or crenate.
D. Lvs. smooth above, 6–18 cm. long.....6. *I. Fargesii*
DD. Lvs. rugose above, 2–5 cm. long.....7. *I. rugosa*
AA. Fls. and frs. solitary or in solitary peduncled infl. axillary on the young brts.
B. Fr. red.
C. Lvs. coarsely spiny-toothed.....8. *I. opaca*
CC. Lvs. entire; fr. long-peduncled.....9. *I. pedunculosa*
CCC. Lvs. crenate or serrulate, 1.5–3 cm. long.....10. *I. yunnanensis*
BB. Fr. black.
C. Lvs. with few obtuse teeth near apex or entire: fls. 5–8-merous.....11. *I. glabra*
CC. Lvs. serrate or crenate, very rarely with only few teeth near apex; fls. 4-merous. 12. *I. crenata*

Lvs. deciduous
A. Nutlets smooth on back: lvs. and frs. never fascicled on short spurs.
B. Fr. on slender peduncles 1–3.5 cm. long, pendulous: lvs. acuminate....13. *I. geniculata*
BB. Fr. short-stalked.
C. Fls. 4–5-merous: fr. 4–5 mm. across.....14. *I. serrata*
CC. Fls. 5–8-merous: fr. 6–8 mm. across.
D. Lvs. pubescent at least on the veins beneath, dull above: all fls. short-stalked. 15. *I. verticillata*
DD. Lvs. glabrous or nearly so beneath, lustrous above: staminate fls. long-stalked. 16. *I. laevigata*
AA. Nutlets ribbed on back.
B. Fr. on a stalk 7–10 mm. long: staminate infl. several-fld.: lvs. acutish, reticulate beneath. 17. *I. Amelanchier*
BB. Fr. short-stalked: staminate infl. 1-fld.: lvs. and frs. often fascicled on short spurs.
C. Lvs. obtusely serrate, usually broadest above the middle and obtuse, 3–7 cm. long. 18. *I. decidua*
CC. Lvs. sharply serrate, acute or acuminate, 5–12 cm. long.....19. *I. dubia*

Subgen. I. AQUIFOLIUM Gray. Lvs. evergreen. (Subgen. *Euilex* Loes.)
Sect. 1. Aquifolium Maxim. Fls. or infls. fascicled, rarely solitary in the axils of lvs. on last year's brts.

1. I. Aquifòlium L. English H. Tree to 15 or occasionally to 25 m., with short spreading brs. forming usually a dense pyramidal or oblong head; young brts. glabrous or minutely puberulous: lvs. short-petioled, ovate or elliptic to oblong-ovate, 3–7 cm. long, margin wavy with large triangular spiny teeth,

on old trees partly or mostly entire, lustrous, glabrous: fls. white, fragrant, short-stalked: fr. globose, 7–10 mm. across, bright red, on stalks 4–8 mm. long, usually clustered. Fl.v–vi; fr.ix(–iii). F.D.21:t.2178(c). S.E.2:t.316 (c). Gng.4:83(h). S.L.228(h). M.D.1919:t.5,6(h). E.H.7:t.377(h). W. and S. Eu., N. Afr., W. Asia to China. Cult. since ancient times. Zone VI or VII. —Ornamental tree much cult. for its handsome lustrous foliage, dense habit and the bright red fr. remaining on the tree during the winter. A very large number of garden forms with green or variegated lvs. are in cult., particularly in England. (For an account of these forms see T. Moore in G.C.II.2,4,5,and 6; also D.H.62–117 and E.H.7:1704–15.—Var. **heterophýlla** Ait. Lvs. elliptic or elliptic-ovate, about 6 cm. long, entire or partly with few teeth. G.C.II.2: 519.—Var. **férox** Ait. Hedgehog H. Lvs. with short teeth and numerous small spines on the upper convex surface. (Var. *echinata* DC., *I. echinata* Mill.) There are also variegated forms.—Var. **péndula** Loud. With pendulous brs. D.H.62,t(h). Gn.85:164(h);87:17(h). G.M.41:81(h).—Var. **bacciflàva** West. With yellow fr. (Var. *flava* Sweet, var. *xanthocarpa* K. Koch, var. *fr. luteo* Loud., *I. chrysocarpa* Wender.) Gn.87:439;88:857.—Var. **chinénsis** Loes. Lvs. ovate-oblong to lance-ovate, 7–11 cm. long, spinose-dentate: fr. smaller on very short stalks. D.H.130,t.f.2. C. China. Intr. 1901.

I. A. × *perado* = **I. altaclarénsis** Dallim. Lvs. elliptic, 6–10 cm. long, thinner, with more numerous and more regular teeth and rather plane margin. G.C.III. 34:322(h). Gn.88:856(h). D.H.141.t,frontisp.(h). Here belong *I. A.* vars. *belgica, camelliaefolia, Hendersonii, Hodginsii, Lawsoniana, nobilis, Wilsonii* (*I. W.* Dallim., not Loes. nor Kache.) Cult. 1838.—*I. A.* × *latifolia* = **I. Koehneàna** Loes. Lvs. elliptic or ovate, 10–16 cm. long, densely spinose-dentate. Cult. 1900. —*I. A.* × *dipyrena* = **I. Beànii** Rehd. Lvs. larger and narrower, dull green above. (*I. dipyrena* var. *elliptica* Dallim., *I. elliptica* Bean, not H.B.K.) Cult. 1900.

2. **I. cornùta** Lindl. Shrub to 3 m., with spreading brs. forming a broad dense bush: brts. glabrous: lvs. short-stalked, oblong-rectangular, 3.5–10 cm. long, with 3 strong almost equal spines at the broad apex and 1 or 2 strong spines on each side at base, or on older plants rounded at base, dark green and lustrous above: fr. globose, 8–10 mm. across, bright red, on stalks 8–15 mm. long, clustered. Fl.iv–v; fr.ix. B.M.5059(c). G.C.1850:311. F.S.7:216;9:t. 895(c). U.S.Im.205:t.331, 332(h). E. China. Intr. 1846. Zone VI or VII. —Ornamental shrub with handsome lustrous lvs. of odd shape.

3. **I. Pérnyi** Franch. Shrub or sometimes tree to 10 m.; young brts. minutely pubescent: lvs. crowded, rhombic or quadrangular-ovate, 1.5–3 cm. long, with 1–3 spines on each side, the upper pair the largest, but shorter than the terminal spine, dark glossy green above, glabrous; petiole 2 mm. long, puberulous; fls. pale yellow, in dense sessile clusters: fr. subsessile, globose-ovoid, 6–8 mm. long, red, clustered. Fl.v; fr.viii. H.I.16:1539. G.C.III.45: 75. R.B.35:24(h). M.G.24:146(h). C. and W. China. Intr. 1900. Zone VI. —Var. **Veìtchii** Rehd. Lvs. larger and broader, 3.5–5 cm. long, with 4–5 rigid spines on each side. D.H.130,t.f.4. Intr. 1900.—Var. **manipurénsis** Loes. Lvs. more ovate, larger, with shorter terminal spine. (*I. Wilsonii* Kache, not Loes.) W. China, Manipur. Cult. 1913.—Ornamental shrub of compact habit.

4. **I. dipyrèna** Wall. Tree to 12 m.; young brts. puberulous, angular: lvs. elliptic-ovate to oblong, 5–10 cm. long, acuminate, cuneate, remotely spiny-dentate, or on old trees partly entire, dull green above; petiole 3–6 mm. long: fls. very short-stalked; staminate peduncles usually 1-fld.: fr. subsessile, globose-ovoid, about 8 mm. long, red, with usually 2 stones. Fl.iv–v; fr.x–xii. Wallich, Pl. As. Rar.3:t.292(c). Brandis, For. Fl.t.15. S.H.2:105r-s²,108c. S.L.229(h). D.H.124,t(h). (*I. Wallichiana* Hort.) Himal. Intr. 1840. Zone

VII or VIII.—Var. **paucispinòsa** Loes. Lvs. ovate to ovate-oblong, 5–7 cm. long, with only 3–5 teeth on each side. W. China. Intr. 1901?

I. d. × *Aquifolium* = *I. Beanii*; see under No. 1.

A closely related species is **I. ciliospinòsa** Loes. Shrub to 4 m.; young brts. densely short-villous: lvs. ovate, 2.5–4 cm. long, spinose-serrate with small aristate teeth pointing forward. M.D.1919:t.2A,B. C. and W. China. Intr. 1908. Zone VII?

5. **I. íntegra** Thunb. Shrub or tree to 12 m.; brts. glabrous, angled: lvs. slender-stalked, elliptic or elliptic-oblong or oblong-obovate, 5–10 cm. long, at the apex contracted into a short obtuse point, cuneate, entire, very rarely with a few teeth, dark green and lustrous above; petiole 8–15 mm. long: fls. fascicled: fr. subglobose, about 1 cm. across, red, on stalks 5–8 mm. long, fascicled or solitary. Fl.III–IV; fr.VIII–IX. S.I.1:t.60(c). G.C.III.69:15. Japan. Intr. 1864. Zone VIII.—Var. **leucóclada** Maxim. Mature brts. pale yellow: lvs. thinner, to 14 cm. long, sometimes slightly serrulate, with acutish point. (*I. l.* Mak.) C. Japan. Intr. 1915. Zone (V).

6. **I. Fargèsii** Franch. Shrub or tree to 6 m.; brts. glabrous; lvs. oblong-lanceolate to oblanceolate or linear-lanceolate, 6–12 cm. long, long-acuminate, cuneate, serrulate above the middle, dull green above; petiole 8–12 mm. long: staminate fls. short-stalked, in dense clusters: frs. globose, 6–8 mm. across, red, usually clustered, on stalks 2–6 mm. long. Fl.V–VI; fr.IX–X. D.H.130,t,f.1. W. China. Intr. 1900. Zone VII or VIII.—Ornamental shrub easily distinguished from the other species by its long and narrow lvs.

A closely related species is **I. Franchetiàna** Loes. Lvs. elliptic-obovate to lance-oblong or oblanceolate, 4–10 cm. long, abruptly acuminate, usually broad-cuneate, denticulate: frs. short-stalked, in dense clusters. W. China. Intr. 1907. Zone VII?—Other related species are: **I. corállina** Franch. Tree to 7 m.: lvs. lance-oblong to lanceolate, 6–14 cm. long, sharply serrate or serrulate, acuminate, lustrous above; petiole 4–8 mm. long: frs. 3–4 mm. across, clustered, subsessile. C. and W. China. Intr. about 1900. Zone VIII?—**I. latifòlia** Thunb. Tree to 20 m.: lvs. elliptic to oblong-lanceolate, 8–18 cm. long, acuminate, serrate, lustrous: petiole 1–2 cm. long: frs. about 8 mm. across, short-stalked, in dense clusters. B.M.5597(c). P.F.3:f.240. S.I.1:t.62(c). Japan. Intr. 1840. Zone VIII.—*I. l.* × *Aquifolium* = *I. Koehneàna;* see under No. 1.

7. **I. rugòsa** Fr. Schmidt. Low spreading, sometimes prostrate shrub; brts. glabrous, angled: lvs. ovate-oblong to lanceolate, 1.5–5 cm. long, obtusish or acute, rounded to broadly cuneate at base, remotely crenate-serrate, dark green lustrous and rugose above; petiole 2–3 mm. long; staminate fls. several, short-stalked, pistillate 1 or 2: fr. about 6 mm. across, red, on stalks 2–4 mm. long. Fl.V–VI; fr.VIII–IX. Mém. Acad. Sci. St. Pétersb.VII.12,2:t.3. Japan, Saghal. Intr. 1895. Zone V or IV.

Here may be mentioned **I. vomitòria** Ait. Tree to 8 m.; young brts. puberulous: lvs. short-stalked, elliptic to ovate-oblong, 1–3, rarely to 5 cm. long, obtusish, crenate, glabrous: frs. about 5 mm. across, short-stalked, usually clustered. S.S. 1:t.48. B.B.2:487. C.L.13:498(h). (*I. Cassine* Walt., *I. caroliniana* Loes., not Mill., *I. peragua* Trel., partly.) Va. to Fla., w. to Ark. and Tex. Intr. 1700. Zone VIII.

Sect. 2. Lioprinus Loes. Fls. or infl. solitary, in the axils of the lvs. on young brts. or at the base of the young brts.

8. **I. opàca** Ait. American Holly. Tree with spreading brs. forming a narrow pyramidal head, to 15 m.; young brts. finely puberulous: lvs. elliptic to elliptic-lanceolate, 5–10 cm. long, with large remote spiny teeth, rarely nearly entire, dull green above, yellowish green beneath; petiole 6–12 mm. long; staminate fls. in 3–9-fld. stalked cymes: fr. globose, about 6 mm. across, red, usually solitary. Fl.VI; fr.X(–IV). Em.385,t(c). S.S.1:t.45. Gng.4:276, 277(h). Gn.M.4:237(h);33:232(h). Am.For.31:726(h). (*I. quercifolia* Meerb.) Mass. to Fla., w. to Mo. and Tex. Intr. 1744. Zone V.—Var. **subíntegra**

Weatherby. Lvs. entire or nearly so. Bull. Torr. Bot. Club,8:113.—Var. **xanthocárpa** Rehd. Fr. yellow. Intr. 1901.—Ornamental tree, not as handsome as *I. Aquifolium*, but hardier.

9. **I. pedunculôsa** Miq. Shrub or small tree to 10 m.: brts. glabrous: lvs. ovate or elliptic, 3–7 cm. long, rounded or broad-cuneate at base, acuminate, entire, lustrous green above; petiole 1–2 cm. long: fls. in slender-peduncled cymes: fr. subglobose, 6 mm. across, bright red, on slender pedicels 1–2 cm. long, solitary or several on a slender peduncle 2–4 cm. long. Fl.VI; fr.X. S.I.1:t.61(c). Japan. Intr. 1892. Zone (V).—Var. **continentâlis** Loes. Lvs. 8–12 cm. long, thicker, often remotely appressed-serrulate above the middle: sepals ciliate. C. China. Intr. 1901. Zone VII.—Ornamental shrub, one of the hardiest evergreen Hollies.

A closely related species is **I. rotúnda** Thunb. Tree to 12 m.: lvs. elliptic to oblong, 4–11 cm. long, acute, entire; petioles 1.2–2.8 cm. long: fr. 5–6 mm. across; pedicels 3–8 mm.; peduncle 6–12 mm. long. S.I.1:t.60(c). F.S.7:216. G.C.1850: 311. P.F.1:f.28. Japan, Korea. Intr. about 1850. Zone VII or VIII.

10. **I. yunnanénsis** Franch. Shrub to 4 m.; brts. densely short-villous: lvs. short-stalked, ovate to oblong-ovate, 1.5–3 cm. long, acute, crenate-serrate or serrulate, lustrous above, pubescent below when young, at least on the midrib, reddish brown when young: staminate fls. several, on slender peduncles: pistillate solitary: fr. globose, 6 mm. across, red, on a slender stalk 4–8 mm. long. M.D.1919:t.1G-L. Fl.VI; fr.IX. W. China. Intr. 1901. Zone VII?—Var. **géntilis** Loes. Lvs. and often the brts. glabrous or nearly so. Intr. 1910. Zone (V).—Ornamental shrub similar to *I. crenata*, but fr. red; the var. is apparently hardier.

A related species is **I. Sugerôki** Maxim. Dense shrub to 2 m.; brts. finely pubescent; lvs. elliptic, 2–4 cm. long, acute or acutish, cuneate, serrate or crenate-serrate above the middle, glabrous; petioles short, puberulous: staminate fls. usually 3 on a peduncle 8–10 mm. long: fr. solitary, about 7 mm. across, on a stalk 1–2 cm. long (to 4 cm. in var. *longipedunculata* Maxim.). Mem. Acad. Sci. St. Pétersb.VII,29,3:t.1,f.7. S.I.2:t.38 (as *I. crenata;* frs. should be red). Japan. Intr. 1914. Zone V?.

11. **I. glábra** Gray. INKBERRY. Evergreen or half-evergreen shrub to 2.5 m., with upright brs., puberulous when young: lvs. obovate to oblanceolate, 2–5 cm. long, acute or obtusish, cuneate, with few obtuse teeth near apex or entire, dark green and lustrous above, glabrous; petiole 3–6 mm. long; staminate fls. several on a slender stalk, pistillate, often solitary, 5–8-merous: fr. globose, 6 mm. across, short-stalked, black. Fl.VI; fr.IX(–V). L.B.450(c). B.B.2:487. (*Prinus glaber* L.—Winterberry.) N. S. to Fla., w. to Mo. Intr. 1759. Zone V.—Ornamental shrub with handsome foliage.

Another black-fruited species is **I. szechwanénsis** Loes. Shrub to 4 m.: lvs. elliptic-ovate to oblong-lanceolate, 3–6 cm. long, crenately or finely serrulate, lustrous: fls. 4–6-merous, solitary or the staminate sometimes 2–3-fld., at base of the young brts. and also on the old brts.: fr. 6–8 mm. across, on a stalk 4–8 mm. long. C. China. Intr. 1907. Zone VII.

12. **I. crenàta** Thunb. Much-branched shrub, rarely small tree to 7 m.; young brts. minutely puberulous, tercte: lvs. crowded, short-stalked, elliptic or obovate to oblong-lanceolate, 1.5–3 cm. long, acute, cuneate or broad-cuneate, crenate-serrulate or serrulate, lustrous dark green above, glabrous: fls. 4-merous, the staminate in 3–7-fld. cymes, the pistillate solitary: fr. globose, 6 mm. across, on a stalk 4–6 mm. long. Fl.V–VI; fr.X. M.D.1919:t. 1A-F. F.E.30:1161(h). Gng.6:165(h). Gn.M.4:273(h). S.L.231(h). (*I. Fortunei* Hort.) Japan. Intr. 1864. Zone V or VI.—Var. **latifôlia** Goldring. Lvs. elliptic or obovate to oblong-obovate. (Var. *typica* Loes., var. *major* Hort., var. *elliptica* Hort.) D.H.118,t,f.6. The typical form.—Var. **luteo-**

variegàta Reg. Lvs. spotted yellow. (Var. *aureo-variegata* Goldring, var. *variegata* Bean.)—Var. **longifòlia** Goldring. Lvs. elliptic-oblong to lanceolate. —Var. **microphýlla** Maxim. Lvs. elliptic to elliptic-oblong, 8–14 mm. long. Somewhat hardier than the type.—Var. **nummulària** Yatabe. Dwarf compact shrub: lvs. broad-ovate to orbicular, 4–15 mm. long, with few small teeth near apex, sometimes entire, very crowded: fr. on stalks about 2 mm. long. D.H. 118,t,f.5. (Var. *Mariesii* Dallim.) Intr. 1879.

Subgen. II. PRINUS Gray. Lvs. deciduous: fls. solitary in the axils of the lvs. or fascicled, together with the lvs.: fr. red.

Sect. 1. EUPRINUS Loes. Nutlets smooth on back: frs. 4–8 mm. across: lvs. and fls. never fascicled.

13. **I. geniculàta** Maxim. Slender-branched shrub; brts. glabrous: lvs. ovate to elliptic-ovate, 3–5 cm. long, acuminate, rounded at base, sharply serrate, slightly pubescent on midrib beneath: fls. long-stalked; staminate infl. 3–7-fld.: fr. globose, 5 mm. across, red, on a filiform pendulous stalk 1.5–3.5 cm. long. Fls.v–vi; fr.viii. Mém. Acad. Sci. St. Pétersb.VII.29,3:t,f.10. G.C.III.74:235. H.B.1:77. Japan. Intr. 1894. Zone V.—Ornamental shrub, very attractive and distinct with its red berries on slender pendulous stalks; the lvs. turn yellow in autumn.

14. **I. serràta** Thunb. Shrub to 5 m.; young brts. puberulous: lvs. elliptic or ovate, 2–5 cm. long, acute or acuminate, serrulate, dull green above, pubescent beneath: fls. short-stalked, 4–5-merous: fr. globose, red, 4–5 mm. across. Fl.vi; fr.x. S.I.1:t.61(c). S.T.1:t.15. (*I. Sieboldii* Miq., *I. serrata* var. *S.* Rehd.) Japan. Intr. 1866. Zone V.—Var. **xanthocárpa** Rehd. Fr. yellow (var. *fr. luteo* Hort.)—Var. **leucocárpa** Bean. Fr. white (var. *fr. albo* Hort.) —Var. **argùtidens** Rehd. Lvs. glabrous beneath, the teeth more remote and less fine; petioles shorter: fls. usually 4-merous. Add.3:t.106(c). (*I. argutidens* Miq.) Intr. 1892.—Ornamental shrub, similar to *I. verticillata*, but smaller in every part; fr. less persistent.

15. **I. verticillàta** Gray. BLACK-ALDER. Shrub to 3 m., with spreading brs.: lvs. elliptic or obovate to oblanceolate or oblong-lanceolate, 3.5–7 cm. long, acute or acuminate, cuneate, serrate or doubly serrate, usually pubescent beneath, at least on the veins: all fls. short-stalked; staminate infl. 2–10-fld.: fr. globose, bright red, about 6 mm. across, often in pairs. Fl.vi–vii; fr.x(–i). B.M.8832(c). Add.3:t.116(c). Em.388,t(c). G.C.III.68:201. F.E. 24:779(h). (*Prinos verticillatus* L.) Can. to Fla., w. to Wis. and Mo. Intr. 1736. Zone IV.—Var. **chrysocárpa** Robins. Fr. yellow. Intr. 1885.—Var. **tenuifòlia** Wats. Lvs. usually obovate, thinner, larger, pellucid-punctate under the lens: fr. usually solitary. B.B.3:489. (*I. bronxensis* Brit.) —Ornamental shrub chiefly valued for its bright red berries persisting a long time on the brs.; the lvs. turn black or brown after frost.

16. **I. laevigàta** Gray. WINTERBERRY. Shrub to 2, rarely 3 m., with upright brs. glabrous when young: lvs. lance-ovate to lanceolate, 3–6 cm. long, acuminate, cuneate, appressed-serrulate, lustrous and bright green above, glabrous or slightly pubescent on the veins beneath; staminate fls. 1–2 on slender stalks 8–18 mm. long; sepals not ciliate: fr. depressed-globose, 7–8 mm. across, orange-red, solitary, short-stalked. Fl.v–vi; fr.ix(–i). Gt. 55:t.1551,f.3(c). G.F.4:221. B.C.3:1640. S.L.231(h). Me. to Pa. and Va. Intr. 1812. Zone IV.—Var. **Herveŷi** Robins. Fr. yellow. Intr. ?—Ornamental shrub planted for its orange-red fr.; the lvs. turn yellow in autumn.

Sect. 2. PRINOIDES Gray. Nutlets ribbed or striate on back; fr. 8–12 mm. across: fls. and lvs. often fascicled on short spurs.

17. **I. Amelánchier** Curtis. Shrub to 2 m.; young brts. slightly pubescent: lvs. elliptic-oblong to oblong, 3.5–7 cm. long, acutish, rounded to broad-cuneate at base, obscurely serrulate, pubescent and reticulate beneath: fls. slender-stalked, at base of brts. below the lvs.; staminate infl. 6–9-fld.: fr. globose, 8–10 mm. across, scarlet, solitary on a stalk 7–10 mm. long. Fl.VI; fr.X–XI. G.F.2:41. B.C.3:1639. Va. to La. Intr. 1880. Zone (V).—Ornamental shrub, attractive in fr.

A related species is **I. lóngipes** Chapm. Lvs. elliptic to broadly elliptic or elliptic-obovate, 3–5 cm. long, acute or obtusish, remotely crenate-serrulate, glabrous or pubescent when young: staminate fls. solitary; fr. 8–10 mm. long on a stalk 1–2 cm. long. N. C. and Tenn. to Ga. and Ala. Intr. 1906. Zone V.

18. **I. decídua** Walt. Shrub or small tree to 10 m., with light gray spreading brs.; brts. glabrous: lvs. partly fascicled, obovate to obovate-oblong, 3.5–7 cm. long, usually obtusish, cuneate, obtusely serrate, dark green and lustrous above and with impressed veins, pale and pubescent on the midrib beneath, thickish; staminate fls. on slender stalks about 1 cm. long; calyx-lobes obtuse: fr. globose, 7–8 mm. across, orange to scarlet. Fl.v; fr.IX–X(–IV). S.S.1:t.49. G.C.II.14:689. S.H.2:f.105i-z^1;109g-h. S.L.232(h). (*I. prinoides* Ait., *Prinus deciduus* DC.) Va. to Fla., w. to Tex. Intr. 1760. Zone V.

19. **I. dúbia** Britt., Sterns, Poggenb. Shrub or slender tree to 12 m.; young brts. pubescent; lvs. broad-ovate to oblong-lanceolate, 4–12 cm. long, acute or acuminate, rounded or broad-cuneate at base, sharply serrate, soft-pubescent beneath; petioles 6–15 cm. long: staminate fls. slender-stalked; calyx-lobes acute or acutish, pubescent: fr. about 1 cm. across, orange-red, on stalks about 6 mm. long. Fl.v; fr.IX(–IV). (*I. mollis* Gray, *I. monticola* var. *mollis* Britt.) W. Mass. to Ga. Intr. 1736. Zone V.—Var. **Beàdlei** Loes. Lvs. ovate to elliptic-oblong, 4–9 cm. long, scarcely acuminate, densely pubescent. N. C. and Tenn. to Ga. and Ala. Cult. 1906. Zone VI?—Var. **montícola** Loes. Brts. glabrous: lvs. larger and narrower, ovate to lanceolate, 6–16 cm. long, pubescent only on the veins beneath or nearly glabrous. S.S.1:t.50. B.B.2:488. (*I. montana* Gray, *I. monticola* Gray.) N. Y. to S. C., w. to Ala. Intr. 1887. Zone V.—Var. **macrópoda** Loes. Lvs. ovate to elliptic, more coarsely serrate, pubescent beneath, chiefly on the veins; petioles to 2 cm. long. S.I.1:t.59(c). (*I. m.* Miq.) Japan. Intr. 1894.

A related species is **I. macrocárpa** Oliv. Tree to 10 m.; glabrous: lvs. elliptic to lance-oblong, 6–12 cm. long, serrulate: fls. about 1 cm. across, 5–7-merous: fr. about 1.5 cm. across, black. H.I.18:1787. C. China. Intr. 1908. Zone VII?

2. **NEMOPÁNTHUS** Raf. Deciduous slender-branched shrub, glabrous or nearly so; buds ovoid, small, with about 3 outer scales: lvs. alternate, slender-petioled, entire or slightly toothed; stipules small, caducous: fls. polygamo-dioecious, small, whitish, on slender axillary peduncles, the staminate 1–4-fld., the pistillate 1-fld.; sepals 4–5; petals linear, 4–5; stamens free, with slender filaments: fr. a drupe with 4–5 bony nutlets. (Greek *nema*, thread, and *anthos*, flower; referring to the filiform pedicels.) Syn. *Nemopanthes* DC., *Iliciodes* Dum.-Cours. One species.

N. mucronàta Trel. Mountain Holly. Shrub to 3 m.; young brts. purplish, older ones ashy-gray: lvs. elliptic to oblong, 2.5–3.5 cm. long, mucronate, entire or sometimes slightly toothed, grayish green beneath; petiole 6–12 mm. long: fls. 4–5 mm. across; pedicels 1–2, in fr. to 3 cm. long: fr. subglobose, 6–8 mm. across, dull red. Fl.v–VI; fr.VIII–IX. S.T.3:t.81. B.B.2:490. (*N. canadensis* DC., *N. fascicularis* Raf., *Iliciodes m.* Britt.) N. S. to Ont., Wis. and Va. Intr. 1802. Zone III.—Ornamental shrub with handsome

bright green foliage turning yellow in autumn and with attractive red fr. in August.

Fam. 54. CELASTRACEAE Lindl. STAFF-TREE FAMILY

Shrubs or trees often climbing: lvs. alternate or opposite, simple; stipules small: fls. perfect or unisexual, regular, small, usually greenish, in axillary or terminal cymes or sometimes solitary; sepals and petals 4–5, imbricated; stamens 5, rarely 10; disk present; ovary superior, 2–5-celled, each cell with 1–2 ovules; style short or nearly wanting, with 2–5-lobed stigma: fr. a dehiscent caps., rarely a drupe or samara; seed albuminous, usually arillate; embryo with broad, flat, usually green cotyledons and short radicle.—About 38 genera with 375 species distributed through both hemispheres except the arctic zone.

A. Fr. a dehiscent capsule.
  B. Fr. of 3–5 carpels.
    C. Caps. 4–5-celled, usually lobed: lvs. opposite, rarely alternate and linear; upright or climbing by rootlets. . . . . 1. *Evonymus*
    CC. Capsule 3-celled, subglobose: lvs. alternate, broad; twining shrubs. . . . . 2. *Celastrus*
  BB. Fr. usually of 1 carpel: low shrubs with small lvs. 5–40 mm. long.
    C. Lvs. opposite, persistent; unarmed shrubs. . . . . 3. *Pachistima*
    CC. Lvs. alternate, deciduous, entire; stamens 10: spiny shrub. . . . . 4. *Glossopetalum*
AA. Fr. indehiscent, 3-winged: fls. in large terminal panicles: lvs. alternate, large. 5. *Tripterygium*

1. EVÓNYMUS L. SPINDLE-TREE. Deciduous or evergreen shrubs or small trees, sometimes creeping or climbing by rootlets; brts. usually 4-angled; buds usually conspicuous with imbricate scales: lvs. opposite, petioled, rarely alternate or whorled, usually glabrous: fls. 4–5-merous, usually perfect, in axillary cymes; stamens short, inserted on the disk; ovary connate with the disk: fr. a 4–5-celled, or occasionally 2–3-celled caps., usually lobed and sometimes winged; each cell with 1–2 seeds enclosed in a fleshy usually orange aril; seed white to red or black. (*Euonymos*, its ancient Greek name.) About 120 species in N. and C. Am., Eu. and Asia, also in Australia.—Ornamental shrubs chiefly planted for their attractive fr.

Lvs. deciduous (half-evergreen in a var. of No. 12 and in No. 4).
A. Lvs. usually alternate or whorled, linear, entire or nearly entire: fr. 4-lobed. . . . 1. *E. nana*
AA. Lvs. opposite.
  B. Fr. divided nearly to the base into 4 separate pods, sometimes reduced to 1–3; brts. usually with broad corky wings. . . . . 2. *E. alata*
  BB. Fr. at most deeply lobed.
    C. Winter-buds small, conic, scarcely exceeding 5 mm. in length: fr. 4-lobed with obtuse lobes or 5-lobed and warty.
      D. Anthers yellow.
        E. Brts. densely warty; seed black, not wholly covered by the aril. . 3. *E. verrucosa*
        EE. Brts. smooth.
          F. Caps. tuberculate, depressed-globose: fls. 5-merous.
            G. Lvs. lance-ovate to lance-oblong, half-evergreen: upright shrub. 4. *E. americana*
            GG. Lvs. obovate, deciduous: procumbent shrub. . . . . 5. *E. obovata*
          FF. Caps. smooth, 4-lobed. . . . . 6. *E. europaea*
      DD. Anthers purple: fls. 4-merous (5-merous in *E. occidentalis*, see under No. 7).
        E. Fls. purple; lvs. pubescent beneath. . . . . 7. *E. atropurpurea*
        EE. Fls. yellowish or whitish: lvs. glabrous or only pubescent on midrib beneath.
          F. Petioles ⅛ to ⅙ as long as lf: lvs. acute or gradually acuminate.
            G. Lvs. oblong to ovate-oblong, broadest at or below the middle.
              H. Lvs. serrulate, 1.5–3 cm. broad, gradually narrowed at base: aril closed. 8. *E. Maackii*
              HH. Lvs. crenate-serrulate, 2–5 cm. broad, broad-cuneate to rounded at base: aril open at apex.
                I. Filaments very short; peduncles 1.5–3.5 cm. long. . . . . 9. *E. hians*
                II. Filaments 1–2 mm. long; peduncles 5–20 mm. long. . 10. *E. lanceifolia*
            GG. Lvs. generally obovate or obovate-oblong, to 6 cm. broad. 11. *E. yedoensis*
          FF. Petiole usually ⅓ to ¼ as long as lf.; lvs. abruptly long-acuminate. 12. *E. Bungeana*

cc. Winter-buds elongated, pointed, 6–10 mm. long (shorter in No. 16): fr. 5-merous or 4-merous and winged.
d. Fls. 4-merous: fr. winged ..... 13. *E. sanguinea*
dd. Fls. 5-merous.
e. Fr. winged or angled.
f. Petioles grooved above: fr. distinctly winged ..... 14. *E. latifolia*
ff. Petioles flat: fr. angled ..... 15. *E. planipes*
ee. Fr. globose, with 5 slender ribs ..... 16. *E. oxyphylla*

Lvs. persistent (half-evergreen in No. 17): **fls. 4-merous**
a. Lvs. serrate or crenate, petioled.
b. Fr. subglobose, smooth.
c. Lvs. rather thin, half-evergreen: cymes loose, 5–7 cm. across, in August .. 17. *E. patens*
cc. Lvs. thick, persistent: cymes rather dense.
d. Upright shrub or small tree: lvs. usually obovate and obtuse, lustrous above. 18. *E. japonica*
dd. Low procumbent or climbing shrub: lvs. dull green above ..... 19. *E. radicans*
bb. Fr. spiny: lvs. lanceolate, 7–14 cm. long ..... 20. *E. Wilsonii*
bbb. Fr. angled or winged.
c. Lvs. remotely crenate-serrate: fr. 4-angled ..... 21. *E. Sargentiana*
cc. Lvs. sharply serrate: fr. 4-winged ..... 22. *E. pendula*
aa. Lvs. sinuate-dentate with spiny teeth, subsessile: fr. 4-lobed ..... 23. *E. Aquifolium*

1. **E. nàna** Bieb. Low usually procumbent shrub with ascending brs., to 1 m. high, glabrous; brts. angled: lvs. alternate, whorled or occasionally opposite, linear to linear-oblong, 1.5–3.5 cm. long, obtuse or acutish, entire or remotely denticulate and revolute: fls. about 4 mm. across, brownish purple, 1–3 on a slender stalk 1.5–3 cm. long: fr. 4-lobed, pink; seed brown, not wholly covered by the orange aril. Fls.v–vi; fr.viii. S.H.2:f.110h-g. (*E. linifolia* and *E. rosmarinifolia* Hort.) Cauc. to W. China. Intr. 1830. Zone IV.—Var. **turkestànica** Dieck. Lvs. broader, often 6–7 mm. broad, not revolute: fls. 5-merous. Garten-Zeit.2:112,t. (Var. *Koopmannii* Beissn., *E. Koopmannii* Lauche.) Cult. 1883. Zone V.—Adapted for covering rocky slopes; sometimes grafted high on *E. europaea*, when it forms a small pendulous tree.

2. **E. alàta** Reg. Winged S. Shrub to 3 m.; the stiff spreading brs. usually with 2 or 4 broad corky wings: lvs. short-stalked, elliptic to obovate, 3–5 cm. long, acute at the ends, finely and sharply serrate, dark green: fls. yellowish, about 6 mm. across, usually 3 in a short-stalked cyme; fr. of normally 4, but often 1–3 ovoid purplish pods 6–8 mm. long; seed brown, with orange-red aril. Fl.v–vi; fr.ix–x. S.I.1:t.63(c). F.E.32:54(h). (*E. striata* Loes.) Japan, Korea, Manch., China. Intr. about 1860. Zone IV.—Var. **àptera** Reg. Franch. & Sav. Brs. not or slightly winged: habit laxer; fls. 3–5. (Var. *subtriflora* Franch. & Sav.)—Var. **apérta** Loes. Seed black with the aril split at apex. C. and W. China. Intr. 1910.—Ornamental shrub very showy in autumn with its numerous brightly colored fr. and the lvs. turning crimson or rosy scarlet; conspicuous in winter with its broadly winged brs.

3. **E. verrucòsa** Scop. Upright shrub to 2 m.; brts. densely warty: lvs. short-stalked, ovate to lance-ovate, 3–6 cm. long, acuminate, crenate-serrulate: fls. brownish, about 6 mm. across, in usually 3-fld. cymes on a peduncle 2–3 cm. long: fr. deeply 4-lobed, about 6 mm. across, yellowish red; seed black, not wholly covered by the orange aril. Fl.v–vi; fr.viii. R.I.6:t.310,f.5135(c). F.D.21:t.2180(c). H.W.3:55. S. Eu., W. Asia. Intr. 1763. Zone IV.

4. **E. americàna** L. Strawberry-bush. Upright shrub to 2.5 m., glabrous: lvs. lance-ovate to lanceolate, 3–8 cm. long, acuminate, cuneate, crenate-serrate, dark green; fls. reddish green, about 8 mm. across, 1–3 on a slender stalk 1–2 cm. long; petals clawed: fr. 3–5-lobed, about 1.5 cm. across, pink, covered with prickly warts; aril scarlet. Fl.vi; fr.ix–x. L.B.1322(c). M.B.G. 2:t.41(c). B.B.2:491. N. Y. to Fla., w. to Tex. Intr. 1683. Zone VI or VII. —Var. angustifòlia Wood. Lvs. lanceolate to linear-lanceolate, half-evergreen farther south. (*E. angustifolia* Pursh.)

5. **E. obovàta** Nutt. Procumbent shrub with rooting stems and ascending brs. to 0.3 m. high: lvs. obovate or elliptic-obovate, 3–6 cm. long, cuneate, acute to obtusish, crenate-serrate, light green and dull above: fls. greenish purple, 6 mm. across, 1–3 on a stalk 1.5–3 cm. long; petals without distinct claw: fr. usually 3-lobed, about 1.5 cm. across, crimson, warty; aril scarlet. Fl.v; fr.VIII–IX. Gr.G.2:t.171. G.F.9:385. B.C.2:1186. (*E. americana* var. *o.* Torr. & Gr., *E. pendula* Hort., not Wall.) Can. to Ind. and Ky. Intr. 1820. Zone IV.—Ornamental shrub sometimes used as a ground-cover.

6. **E. europaèa** L. EUROPEAN S. Upright shrub or small tree to 7 m.: lvs. elliptic-ovate to lance-oblong, 3–8 cm. long, acuminate, cuneate, crenate-serrate; petiole 6–12 mm. long: fls. yellowish green, about 1 cm. across, usually 3–5 on a stalk 2–3.5 cm. long: fr. red to pink, 4-lobed, about 1.5 cm. across; aril orange. Fl.v; fr.IX–X. R.I.6:t.309(c). F.D.21:t.2179(c). H.W.3:53. B.B.2:492. Gn.84:626. (*E. vulgaris* Mill.) Eu. to W. Asia; sometimes escaped in the E. States. Long cult. Zone IV.—Var. **atropurpúrea** Nichols. With rather narrow purplish lvs. (Var. *purpurea* Bean.)—Var. **atrórubens** Rehd. Fr. crimson. (Var. *fr. atropurpureo* Hort.)—Var. **alba** West. Fr. whitish (Var. *leucocarpa* DC., var. *fr. albo* Hort.)—Var. **nàna** Loud. Dwarf dense, strictly upright form with elliptic to lance-elliptic lvs. 2–3 cm. long. Tenderer than the type.—Var. **intermèdia** Gaud. Lvs. ovate to broad-elliptic, rounded or nearly so at base, large, dark green: fr. bright red. (Var. *macrophylla* Schleich., var. *ovata* Dipp.) R.I.6:t.309(c).—Very ornamental in fr., particularly the forms with bright or deep red fr. There are also forms with variegated lvs.

Related species are: **E. Semenôvii** Reg. & Herd. Small shrub: lvs. lanceolate, 3–4.5 cm. long, serrulate: infl. usually 3-fld. Turkest. Cult. 1910. Zone IV?—**E. Hamiltoniàna** Wall. Small tree: lvs. lance-oblong, 6–10 cm. long, irregularly serrulate: fr. turbinate, 4-lobed, pink. Brandis, For. Fl.1.16. Himal. Intr. 1825. but probably not now in cult. Zone VII?

7. **E. atropurpúrea** Jacq. BURNING-BUSH. Shrub or small tree to 8 m.: lvs. elliptic or ovate-elliptic, 4–12 cm. long, acuminate, serrulate, pubescent beneath; petiole 1–2 cm. long: fls. purple, about 1 cm. across, 7–15 on a slender stalk 2–4.5 cm. long: fr. 4-lobed, 1.5 cm. across, crimson; seed brown, with scarlet aril. Fl.v–VI; fr.X. S.S.2:t.53. M.A.1:t.42(c). B.B.2:491. N. Y. to Fla., w. to Minn., Neb., Okla. and Tex. Intr. 1756. Zone IV.—Ornamental shrub; the lvs. turning pale yellow in autumn.

A related species is **E. occidentàlis** Nutt. Shrub to 5 m.; winter-buds to 8 mm. long: lvs. ovate to elliptic-lanceolate, glabrous: fls. 5-merous, 1.4 cm. across, purple, 1–4. S.H.2:f.115g-h(l). Ore. to Calif. Cult. 1894. Zone VI?

8. **E. Maàckii** Rupr. Large shrub or small tree; glabrous; brts. subterete: lvs. elliptic-oblong to lance-oblong, 5–8 cm. long, acuminate, gradually narrowed at base, serrulate; petiole 5–8 mm. long: fls. yellowish, about 1 cm. across, in small cymes 1.5–2 cm. across on a stalk 1–1.5 cm. long: fr. pink, 4-lobed, about 8 mm. across; seed red with orange aril, sometimes slightly split at apex. Fl.VI; fr.X. M.D.1910:106,f.2,107,f.B. (*E. Hamiltoniana* Dipp., not Wall.) N. China, Manch., Korea. Cult. 1880. Zone V or IV.

9. **E. hìans** Koehne. Large shrub: lvs. ovate-oblong, 6–12 cm. long, short-acuminate, broad-cuneate or nearly rounded at base, serrulate; petiole 6–12 mm. long: fls. yellowish white, about 8 mm. across, usually in 6 or 7-fld. cymes 1.5–3 cm. across on a stalk 1.5–3.5 cm. long; stamens with very short filaments: fr. turbinate, deeply 4-lobed, about 8 mm. across; aril blood-red, split at apex and disclosing the blood-red seed. Fl.v; fr.IX. S.I.2:t.39(c, as *E. europaea*). M.D.1910:106,f.5,107,f.E. S.H.2:f.115n,116a-e. Japan. Intr. about 1865. Zone V.

A closely related species is **E. semiexsérta** Koehne. Lvs. oblong to lance-oblong, usually narrower, crenate-serrulate: fr. whitish pink; aril orange, much split and disclosing nearly ½ of the blood-red seed. M.D.1910:106,f.4;107,f.D. S.H.2:f.604c,605m-p. Japan. Cult. 1895.

10. E. lanceifòlia Loes. Shrub or tree to 10 m.: lvs. elliptic-oblong, to lance-oblong, 8–14 cm. long, acute or acuminate, broad-cuneate, crenate-serrulate, firm at maturity and slightly reticulate beneath and often scabrid-pubescent on the midrib; petioles 4–8 mm. long: fls. 1.2–1.5 cm. across, in usually 7–15-fld. cymes on stalks 5–25 mm. long; filaments longer than anthers, 1–2 mm. long: fr. 4-lobed, pale pink; aril orange, split at apex; seed crimson. Fl. v–vi; fr. x. C. and W. China. Intr. 1900 or 1904.

11. E. yedoénsis Koehne. Large shrub: lvs. obovate to obovate-oblong, sometimes elliptic, 6–12 cm. long and 3.5–6 cm. broad, abruptly acuminate, broad-cuneate, crenate-serrulate; petiole 6–12 mm. long; cyme many-fld., rather dense, on a stalk 1–2 cm. long; filaments somewhat longer or sometimes shorter than the anthers: fr. deeply 4-lobed, about 1 cm. across, pinkish; aril orange, usually closed or with small opening. Fl.vi; fr.ix. Gt.53: 31. S.T.1:t.62. M.D.1910:106,f.3,107,f.C. F.E.31:125(h). Japan, Korea. Intr. about 1865. Zone V.—Var. **calocárpa** Koehne. Fr. bright crimson.—Var. **Koehneàna** Loes. Lvs. short-pubescent on the midrib and on the veins below. C. China. Intr. 1907.

12. E. Bungeàna Maxim. Shrub or small tree to 6 m., with slender brs.; brts. subterete: lvs. elliptic-ovate to elliptic-lanceolate, 5–10 cm. long, long-acuminate, broad-cuneate at base, serrulate; petiole 8–25 mm. long: fls. yellowish in 3–7-fld. cymes on stalks 1–2 cm. long: fr. deeply 4-lobed, about 1 cm. across, yellowish to pinkish white: filaments about as long as anthers; seeds white or pinkish with orange aril usually open at apex. Fl.vi; fr.x. B.M.8656(c). S.T.1:t.63. M.D.1910:106,f.1,107,f.A. M.G.14:569. N. China, Manch. Intr. 1883. Zone V or IV.—Var. **péndula** Rehd. With long and slender pendulous brs.: petioles to 3.5 cm. long. Cult. 1902.—Var. **semipersístens** Schneid. Lvs. elliptic, half-evergreen and persisting until mid-winter or severe frost: fr. turbinate, pink, sparingly produced. S.H.2:f.115l(l). (*E. s.* Sprague.)—Ornamental tree of loose, graceful habit and with pinkish fr. profusely produced and remaining on the brs. long after the lvs. have fallen; the var. *semipersistens* valued for its half-evergreen foliage.

A related species is **E. Sieboldiàna** Bl. Lvs. slender-petioled, elliptic to elliptic-oblong: fr. obovoid, not lobed, but strongly 4-ribbed. M.D.1906:62,f.1c;1910: 106,f.6. S.H.2:f.116f-g. Japan. Not in cult., often confused with other species.

13. E. sanguínea Loes. Shrub or small tree to 7 m.; terminal winter-bud 6–14 mm. long: brts. nearly terete: lvs. broad-elliptic or ovate to oblong-ovate, 4–10 cm. long, acute or acuminate, broad-cuneate or nearly rounded at base, densely fimbriate-serrulate, dull green above, paler beneath and finely reticulate, reddish when unfolding; petiole 5–10 mm. long: fls. 4- or occasionally 5-merous, in loose 3–15-fld. cymes 7–10 cm. wide on a slender stalk 3–5 cm. long: fr. slightly lobed, winged, about 2.5 cm. broad, red; wings 6–8 mm. long; aril orange covering the black seed. Fl.v; fr.ix. B.J.29:t.5a-b. C. and W. China. Intr. 1900. Zone V.—Var. **brevipedunculàta** Loes. Peduncles only about 2 cm. long.—Var. **camptoneùra** Loes. Lvs. somewhat narrower, with curved veins (straight in the type).—Shrub with handsome foliage and attractive fruit.

Related species are: **E. fimbriàta** Wall. Lvs. elliptic to oblong-obovate, 4–10 cm. long, abruptly acuminate, finely and doubly fimbriate-serrulate, thickish at maturity: fls. small, in cymes 1.5–2.5 cm. across: fr. with long, pointed wings. Himal. Cult. 1920. Zone VII?—**E. macrôptera** Rupr. Lvs. obovate to obovate-

oblong, 8–12 cm. long, cuneate: cymes many-fld.: fr. with 4 narrow wings 1–1.8 cm. long. I.T.6:t.233. S.H.2:f.115p,114g. M.I.1:t.38. N. E. Asia, Japan. Cult. 1906. Zone V.

14. **E. latifòlia** Scop. Shrub or small tree to 7 m.; terminal winter-buds 1–1.5 cm. long: lvs. obovate-oblong or elliptic, 6–12 cm. long, short-acuminate, broad-cuneate, crenate-serrulate; petiole about 6 mm. long: fls. greenish, about 1 cm. across, in 7–15-fld. cymes on a stalk 5–6 cm. long: fr. 5-, rarely 4-winged, nearly 2 cm. across, bright red, pendulous; aril orange, seed white. Fl.v–vi; fr.ix. R.I.6:t.310,f.5136(c). F.D.21:t.2181(c). B.M.2384(c). Gn. 39:213. Gt.53:30. H.W.3:54. S. Eu., W. Asia. Intr. 1730. Zone V.—Shrub with handsome foliage and large bright-colored fr. in autumn.

A related species is **E. sachalinénsis** Maxim. Lvs. ovate-oblong, 8–12 cm. long, crenate-serrate: fls. purple, in many-fld. cymes; peduncles 5–7 cm. long: fr. purple, about 3 cm. across, convex at apex. M.I.1:t.37(c). S.H.2:f.114p,115o. N. E. Asia. Intr. ?

15. **E. plànipes** Koehne. Shrub or small tree. Lvs. obovate, 8–12 cm. long, short-acuminate, cuneate, crenate-serrulate; petiole 5–10 mm. long, flat, not grooved above: fls. in many-fld. loose cymes on slender peduncles 3–7 cm. long: fr. 5-angled, but scarcely winged, broadly conical at apex, about 18 mm. across. Fl.v; fr.ix. M.D.1906:62,f.1a. Gt.53:29. S.L.202. M.G.33:9(h),10. (*E. latifolia* var. *p.* Koehne.) Japan. Intr. 1892. Zone V.—Shrub with large lvs., very handsome in fr.

16. **E. oxyphýlla** Miq. Shrub or small tree; upper winter-buds 5–6 mm. long: lvs. ovate to ovate-oblong, 4–8 cm. long, acuminate, rounded or broad-cuneate, serrulate with incurved mucronate teeth, bright green, slightly reticulate beneath; petiole 3–6 mm. long: fls. greenish, suffused with brown, 8–9 mm. across, in loose many-fld. cymes on a peduncle 4–5.5 cm. long; anthers subsessile: fr. subglobose, with 5 or sometimes 4 ribs, about 1 cm. across, dark red, pendulous; aril red. Fl.v; fr.x. S.I.1:t.64(c). B.M.8639(c). M.D.1906:63. Japan. Intr. 1892. Zone V.

17. **E. pátens** Rehd. Half-evergreen or nearly evergreen spreading shrub to 3 m., lower brs. sometimes prostrate and rooting: lvs. broad-elliptic or obovate to oblong-obovate or elliptic-oblong, 5–8 cm. long, acute or obtusish, cuneate, crenate-serrulate, subcoriaceous with obsolete veins beneath; petiole 4–8 mm. long: fls. greenish white, in loose, many-fld. slender-peduncled cymes 5–7 cm. across: fr. globose, about 1 cm. across, pinkish; seed pinkish brown, covered by the orange-red aril. Fl.viii–ix; fr.x–xi. Add.4:t.158(c). S.T.1: t.64. (*E. kiautchovica* var. *p.* Loes., *E. Sieboldiana* Hort., not Bl.) E. and C. China. Intr. about 1860. Zone VI.—Ornamental shrub valued for its late attractive fr.

A related species is **E. grandiflòra** Wall. Shrub to 4 m.: lvs. obovate to obovate-oblong, 4–10 cm. long, acute or obtusish to short-acuminate; crenate-serrulate: fls. about 2 cm. across, whitish, in loose 5–9-fld. cymes: fr. 4-angled, yellowish; seed black; aril scarlet. Wallich, Pl. As. Rar.3:t.254(c). S.H.2:f.112u,114k. Himal., China Intr. 1824. Zone VIII?

18. **E. japónica** L. Evergreen upright shrub or small tree to 5 or occasionally 8 m.; brts. slightly quadrangular: lvs. obovate to narrow-elliptic, 3–7 cm. long, acute to obtuse, cuneate, obtusely serrate, lustrous and dark green above; petiole 6–12 mm. long: fls. greenish white, in 5–12-fld. rather dense cymes on a peduncle 2–5 cm. long: fr. depressed-globose, about 8 mm. across, pinkish, aril orange. Fl.vi–vii; fr.x. S.I.2:t.39(c). B.R.30:6(c). S.H.2:f. 111k-p. S. Japan. Intr. 1804. Zone VII or VIII.—Var. **macrophýlla** Sieb. Lvs. elliptic, 5–7.5 cm. long (var. *robusta* Hort.)—Var. **microphýlla** Sieb. Lvs. narrow-oblong to lance-oblong, 1–2.5 cm. long.—Var. **argénteo-variegàta**

Reg. Lvs. edged and marked white.—Var. **albo-marginàta** T. Moore. Lvs. with a rather narrow white margin.—Var. **aùreo-variegàta** Reg. Lvs. blotched yellow. Lowe, Beautif. Lfd.Pl.t.49(c).—Var. **aùreo-marginàta** Nichols. Lvs. edged yellow. F.E.16:436;29:815(h).—Var. **víridi-variegàta** Rehd. Lvs. large, bright green, variegated with green and yellow in the middle. ("Duc d'Anjou.")—Var. **pyramidàta** Carr. Of strictly upright columnar and very compact habit: lvs. crowded, broad-elliptic. (Var. *columnaris* Carr., var. *pyramidalis* Hort.) Another columnar form, but less compact and with narrow-elliptic lvs. is var. **fastigiàta** Carr.—Ornamental evergreen shrub planted chiefly for its lustrous evergreen lvs. and its compact upright habit.

19. **E. radìcans** Sieb. Low procumbent shrub, trailing and rooting or climbing with rootlets to 8 m.; brts. subterete, minutely warty: lvs. ovate or broad-elliptic to elliptic, 1–3 cm. long, acutish to obtuse, crenate-serrate, usually dull green above and usually with pale veins: fls. and fr. borne on stouter upright brs. similar to those of the preceding species: fr. usually paler, pinkish. Fl.VI–VII; fr.x. R.H.1885:295. G.C.II.20:793. M.D.1906: 219. B.C.2:1188,1187(h). (*E. japonica* var. *radicans* Sieb., *E. repens* Hort.) N. and C. Japan, Korea. Intr. about 1865. Zone V.—Var. **picta** Jacob-Makoy. Lvs. marked white along the veins. R.H.1876:354;1878:135. G.W.1:475. A.G.19:37. (Var. *reticulata* Rehd., var. *argenteo-variegata* Hort., *E. gracilis* Sieb.)—Var. **argenteo-marginàta** Rehd. Lvs. bordered white.—Var. **roseo-marginàta** Rehd. Lvs. bordered pinkish.—Var. **mínima** Simon-Louis. Lvs. marked like *f. picta*, but only 6–15 mm. long. (Var. *kewensis* Hort.)—Var. **Carrièrei** Nichols. Low spreading shrub: lvs. elliptic-oblong 3–5 cm. long, acutish, lustrous. H.B.2:554(h). S.L.203(h). This form fruits freely.—Var. **végeta** Rehd. Low spreading shrub to 1.5 m. tall, but climbing high if growing against a support: lvs. broad-elliptic to almost suborbicular, 2.5–4 cm. long, acute or obtusish, crenate-serrate, dull green, thickish; those of the occasional rooting brts. ovate and smaller and thinner. S.T.1:t.65. M.G. 23:13. W.A.96,t(h). Japan. Intr. 1876. Zone V. This form fruits freely.—Var. **acùta** Rehd. Rooting and climbing: lvs. elliptic to ovate-elliptic, 2.5–5 cm. long, acute or short-acuminate, serrulate, the veins above slightly elevated. (*E. japonica* var. *a.* Rehd.) C. China. Intr. 1907. Zone V.—Var. **coloràta** Rehd. A form of var. *acuta* with larger and thinner lvs. coloring bright red in autumn. Intr. 1914.—The hardiest of the evergreen Evonymus; particularly var. *Carrierei* and var. *vegeta* are to be recommended on account of the attractive usually freely produced fr.

20. **E. Wilsònii** Sprague. Shrub to 6 m., climbing: lvs. lanceolate, 6–14 cm. long, acuminate, cuneate, shallowly serrate, conspicuously veined beneath; petiole 6–12 mm. long: fls. yellowish in many-fld. loose cymes 4–8 cm. across on a stalk 3–5 cm. long: fr. 4-lobed clothed with spines about 5 mm. long, nearly 2 cm. across; aril yellow. Fl.VI; fr.x–XI. G.C.III.72:49. W. China. Intr. 1904. Zone VIII?

A related species is **E. echinàta** Wall. Prostrate: lvs. elliptic-ovate to lance-oblong 4–7 cm. long, acuminate, cuneate, serrate: cymes small, usually 3–7-fld. on a stalk 1–1.5 cm. long: fr. subglobose, about 8 mm. across. B.M.2767(c). Himal. Cult. 1827. Zone VII or VIII.

21. **E. Sargentiàna** Loes. & Rehd. Shrub to 4 m., with slender brts.: lvs. obovate to oblong-obovate, 6–9 cm. long, abruptly acuminate, cuneate, remotely crenate-serrate, dull grayish green above; petiole 8–10 mm. long: fr. 4-angled, not or scarcely lobed, oblong-obovoid, 1.5 cm. long, attenuate at base, yellowish, borne in a loose cyme on a stalk about 3 cm. long. Fr.x. W. China. Intr. 1908. Zone VII?

22. **E. péndula** Wall. Small tree with pendulous brs.: lvs. oblong-lanceolate, 7–14 cm. long, acuminate, broad-cuneate, sharply spinose-serrulate, lustrous above; petiole 5–10 mm. long: fls. 1.2 cm. across, in many-fld. cymes: fr. with 4 tapering wings. P.F.2:55. F.S.7:71. (*E. fimbriata* Hort., not Wall.) Himal. Cult. 1851. Zone VIII?—Evergreen shrub with handsome large and lustrous lvs.

23. **E. Aquifòlium** Loes. & Rehd. Shrub to 3 m.; brts. quadrangular: lvs. subsessile, ovate to ovate-oblong, 4–7 cm. long, spiny sinuate-dentate, dull green above: fr. usually solitary, depressed-globose, 4-lobed, 1.2–1.5 cm. across, greenish; seed purple, only partly enclosed by the orange aril. Fr.x–xi. W. China. Intr. 1908. Zone VII? or VIII.—Remarkable for its holly-like lvs., but of very slow growth in cult.

2. **CELÁSTRUS** L. Staff-tree. Deciduous, rarely evergreen shrubs usually climbing: buds with several imbricate scales: lvs. alternate, petioled, serrate or crenate; stipules small: fls. polygamo-dioecious, small, greenish or whitish, 5-merous, in axillary cymes or terminal panicles; calyx 5-parted; petals oblong-ovate; disk entire or crenate; stamens short; ovary superior; style short, with 3-lobed stigma: fr. a caps., usually yellow, dehiscent into 3 valves each containing 1 or 2 seeds enclosed in a fleshy crimson aril. (*Kelastros*, ancient Greek name of an evergreen tree, probably *Ilex Aquifolium*.) More than 30 species in E. and S. Asia, Australia and Am.—Ornamental twining shrubs chiefly grown for their handsome yellow fr. opening at maturity and disclosing the crimson seeds.

A. Fls. in a terminal panicle.
  B. Brts. terete: lvs. 5–10 cm. long ..... 1. *C. scandens*
  BB. Brts. angular: lvs. 10–18 cm. long ..... 2. *C. angulata*
AA. Fls. in axillary cymes often partly crowded into panicles.
  B. Lvs. glaucous beneath: fls. partly in panicles ..... 3. *C. hypoleuca*
  BB. Lvs. green beneath.
    C. Stipules deciduous: lvs. 5–12 cm. long.
      D. Cymes partly forming terminal panicles: lvs. rugose, reticulate beneath. 4. *C. rugosa*
      DD. Cymes all axillary, sometimes crowded on short leafless lateral brts. 5. *C. articulata*
    CC. Stipules persistent, spinescent, hooked: lvs. 2–6 cm. long, slender-petioled. 6. *C. flagellaris*

1. **C. scandens** L. Waxwork. Climbing to 7 m.: lvs. ovate to oblong-ovate, 5–10 cm. long, acuminate, broad-cuneate at base, serrulate, glabrous; petiole 5–20 mm. long: fls. in panicles 5–10 cm. long: fr. subglobose about 8 mm. across, yellow, with crimson seeds. Fl.vi; fr.x(–xii). S.O.3:t.140(c). Em.545(c). Gr.G.2:t.170. G.F.5:569. B.C.2:701. Gg.5:119. Gn.33:393(h). (False Bittersweet, Climbing B., Shrubby B.) Can. to S. Dak. and N. Mex. Intr. 1736. Zone IV.

A related species is **C. paniculàta** Willd. Brts. brown with numerous small white lenticels: lvs. broad-elliptic or obovate to elliptic-oblong, 5–10 cm. long; petioles 1–1.5 cm. long; panicle 10–20 cm. long. Wight, Ill.t.72;Icon.1:t.158. Himal. Intr. ?

2. **C. angulàta** Maxim. Climbing to 7 m.; brts. angular, finely lenticellate: lvs. broad-ovate to nearly orbicular, 10–18 cm. long and 8–14 cm. broad, abruptly short-acuminate, crenate-serrate, glabrous: petiole 1–2.5 cm. long: panicle 10–15 cm. long: fr. subglobose, about 1 cm. across, on thick short pedicels; aril orange-red. Fl.vi; fr.x–xi. H.I.23:2206. S.H.2:f.117c,118i-k. (*C. latifolius* Hemsl.) Intr. 1900. Zone VII.—Remarkable for its large lvs.

3. **C. hypoleùca** Warb. Climbing to 5 m.; young brts. bloomy: lvs. elliptic to oblong-elliptic, 6–14 cm. long, short-acuminate, remotely serrulate, dark green above, bluish white beneath; petiole 1–1.5 cm. long: terminal panicle

6–12 cm. long, loose, in fr. to 20 cm. long: fr. about 8 mm. across, on slender pedicels 8–15 mm. long. Fl.vi; fr.x. H.I.19:1899. S.H.2:f.117f,118m-q. (*C. hypoglaucus* Hemsl.) C. China. Intr. 1900. Zone VII.

A related species is **C. spicifórmis** var. **laevis** Rehd. & Wils. Lvs. elliptic-oblong to elliptic-lanceolate, crenate-serrulate, slightly glaucescent beneath: terminal panicle narrow, 6–12 cm. long: fr. on pedicels 3–10 mm. long. W. China. Intr. 1908. Zone VII?

4. **C. rugòsa** Rehd. & Wils. Climbing to 6 m.; brts. striate or angular: lvs. elliptic-ovate or elliptic to elliptic-oblong, 5–13 cm. long, short-acuminate, broad-cuneate or rounded at base, crenate-serrate or crenate-dentate, rugose above, reticulate at maturity beneath, glabrous or puberulous on the veins; petiole 1–1.5 cm. long: fls. partly axillary, partly in a terminal raceme 3–4.5 cm. long, in fr. to 7 cm. long: fr. 8–10 mm. across, orange-yellow, on pedicels 5–8 mm. long. Fl.vi; fr.x. W. China. Intr. 1908. Zone VI?

5. **C. articulàta** Thunb. Climbing to 12 m.; brts. terete: lvs. suborbicular to obovate or oblong-obovate, 5–10 cm. long, acute or abruptly acuminate, cuneate, crenate-serrate; petioles 8–2.5 cm. long: fls. in small axillary cymes; the peduncles about as long as the pedicels: fr. orange-yellow, about 8 mm. across; aril scarlet. Fl.vi; fr.x(–xii). B.M.7599(c). G.F.3:550. B.C.2:701. G.C.III.23:29;43:242. Gng.5:119. M.G.17:306. (*C. orbiculatus* Thunb.) Japan, China. Intr. 1860. Zone V.—Var. **punctàta** Makino. Less vigorous: lvs. smaller, elliptic-ovate to elliptic-oblong. (*C. p.* Thunb.) S.H.2:f.117k-l(l).

Closely related species are: **C. Loesenèri** Rehd. & Wils. Lvs. broadly elliptic to lance-elliptic, acuminate, rounded or broad-cuneate, coarsely crenate-serrate; petiole 6–15 mm. long: fls. in subsessile or very short-peduncled cymes. C. China. Intr. 1907. Zone VI.—**C. Rosthorniàna** Loes. Lvs. narrow-elliptic to elliptic-oblong, 4–8 cm. long and 2–3.5 cm. broad, acuminate, cuneate, remotely serrate or serrulate, at maturity thickish, smooth above and with obsolete veinlets beneath, yellowish green; petiole 4–8 mm. long: cymes subsessile or short-stalked. C. and W. China. Intr. 1908. Zone VI?—**C. gemmàta** Loes. Winter-buds conic-ovate, 8–12 mm. long: lvs. elliptic, 5–11 cm. long, abruptly acuminate, broad-cuneate or nearly rounded at base, serrulate or crenate-serrulate, lustrous above and finely reticulate beneath, chartaceous: cymes short-peduncled: fr. 1–1.2 cm. across. B.J.29:t.5f-h. C. and W. China. Intr. 1907. Zone V.—Another related species is **C. Hoôkeri** Prain. Young brts. rufous-puberulous, later white-lenticellate: lvs. elliptic or obovate to elliptic-oblong, 7–10 cm. long, on shoots longer, oblong, long-acuminate, crenate-serrulate: fls. in short cymes: fr. orange. S. China, Himal. Intr. 1908. Zone VII?

6. **C. flagellàris** Rupr. Climbing to 8 m.; brts. with short hooked stipular spines: lvs. broad-elliptic or ovate, 2–5.5 cm. long, abruptly acuminate, broad-cuneate, finely serrulate; petiole 1–3 cm. long: fls. 1–3 in axillary sessile cymes: fr. subglobose, 5–8 mm. across, greenish yellow, with orange-red aril, on pedicels 5–10 mm. long. Fl.vi; fr.x. Ruprecht, Decas Pl. Amur.t.4. S.H.2: f.117a-b(l). N. E. Asia. Cult. 1905. Zone IV.

3. **PACHÍSTIMA** Raf. Low evergreen shrubs; brts. quadrangular, verruculose; buds ovoid with about 2 pairs of outer scales: lvs. short-petioled, opposite, small, serrulate or entire; stipules minute, deciduous: fls. perfect, green or reddish, small, in few-fld. axillary cymes; sepals 4, broad; petals 4, obovate; stamens 4, with short filaments, on the edge of a broad disk; ovary incompletely 2-celled, immersed in the disk; style short, with capitate obscurely 2-lobed stigma: fr. a leathery caps., opening by 2 valves, 1–2-seeded; seed with lacerated thin aril. (Greek *pachys*, thick and *stigma*.) Syn.: *Pachystima* Endl., *Pachystigma* Meisn., *Oreophila* Nutt.) Two species in N. Am. —Ornamental low evergreen shrubs adapted for the rock garden, borders of evergreen shrubberies or as undergrowth in open woods; the first more for half-shady, the second for open situations.

A. Lvs. elliptic to oblong-obovate; pedicels short.....1. *P. myrsinites*
AA. Lvs. generally narrow-oblong; pedicels slender.....2. *P. Canbyi*

1. **P. myrsinites** Raf. Spreading shrub to 0.5 m., with rather stiff brs.: lvs. broad-elliptic to oblong-obovate, 1–3 cm. long, slightly revolute and serrulate or nearly entire: fls. short-stalked: fr. about 8 mm. long, whitish. Fl.v–viii; fr.vii–viii. C.R.215,f.1. S.H.2:f.119a-e. B. C. to Calif. and N. Mex. Cult. 1879. Zone V.

2. **P. Canbyi** Gray. Dwarf shrub with decumbent stem and rooting brs. ascending to 25 cm.: lvs. linear- or narrow-oblong, 6–25 mm. long, revolute and usually serrulate above the middle: fls. about 5 mm. across on pedicels 3–6 mm. long: fr. 4 mm. long. Fl.iv–v. M.N.1:t.44(c). H.B.3:485(h). Mts. of Va. and W. Va. Cult. 1880. Zone V.

4. **GLOSSOPÉTALON** Gray. Deciduous low, much branched shrubs with spinescent brts.: lvs. alternate, small; stipules small: fls. fascicled, white, small; sepals 4–5, short; petals 4–5, narrow; stamens 10 or 5–8, inserted on the edge of the disk; ovary superior, 1-celled, with 2 ovules: fr. a leathery ovoid-oblong pod dehiscent along the ventral suture; seed smooth, with a small 2-lobed aril. (Greek *glosse*, tongue, and *petalon;* referring to the narrow petals.) Syn. *Forsellesia* Greene. Three or 4 species in N. Am.

G. meionándrum Koehne. Shrub to 75 m., with light yellowish gray brts.: lvs. cuneate-oblong to oblanceolate, 6–15 mm. long, grayish green; petals 5, spatulate-oblong 5–6 mm. long; stamens 5–7. Gt. 43:239. Colo. Intr. about 1892. Zone V?

A closely related species is **G. spinéscens** Gray. Lvs. linear-oblong to spatulate; petals linear-lanceolate; stamens 10. Gray, Pl. Wright.t.12b. E.N.III.5:219. S.H.2:f.119f-h. Utah to N. Mex. and Tex. Intr. ?

5. **TRIPTERÝGIUM** Hook. f. Deciduous glabrous shrubs: winter-buds broadly conical with about 2 pairs of outer scales: lvs. alternate, petioled, large; stipules subulate, caducous: fls. polygamous, white, small, in large terminal panicles; calyx 5-lobed; petals 5; stamens 5, inserted at the edge of the cupular disk; ovary superior, 3-angled, incompletely 3-celled, with short style; each cell with 2 upright ovules: fr. a 3-winged 1-seeded nutlet. (Greek *tri*, three, and *pteryx, pterygos*, wing; in reference to the 3-winged fr.) Three species in E. Asia.

T. Regèlii Sprague & Tak. Shrub to 2 m., with long sarmentose warty reddish brown brts.: lvs. broad-elliptic to ovate, 6–15 cm. long, acuminate, broad-cuneate or rounded at base, crenate-serrate, light green, glabrous except puberulous on the midrib beneath when young; petiole 1–2 cm. long: fls. yellowish white, about 8 mm. across, in a terminal panicle leafy at the base, to 20 cm. long; petals orbicular-obovate: fr. 1.5 cm. long, greenish white. Fl.vii–viii; fr.ix–x. Gt.18:612. S.H.2:f.696. (*T. Wilfordii* Regel, not Hook. f.) Manch., Korea, Japan. Intr. 1905. Zone V or IV.—Ornamental shrub chiefly valued for its large lvs. and the large panicles of whitish fls.; without fls. similar to *Celastrus angulatus*.

Fam. 55. STAPHYLEACEAE DC. BLADDERNUT FAMILY

Trees or shrubs: lvs. opposite or alternate, odd-pinnate, stipulate and stipellate: fls. perfect, rarely polygamous, regular, in axillary or terminal panicles; sepals and petals 5, imbricate; stamens 5, inserted at the edge of the disk: ovary usually 3-, rarely 1-celled; styles free or connate, with capitate stigma; ovules usually several or many at the inner angle of the cell: fr. a

caps. with leathery or fleshy walls, dehiscent or indehiscent; seeds 1–few in each cell, with bony or crustaceous testa, albuminous; embryo large with plano-convex cotyledons.—Five genera with about 25 species chiefly in the n. temp. zone.

A. Lvs. opposite: fr. dehiscent with several seeds: fls. perfect.
B. Fr. an inflated caps.: lfts. 3–7, the lateral ones sessile.....1. *Staphylea*
BB. Fr. a fleshy pod: lfts. 7–11, stalked.....2. *Euscaphis*
AA. Lvs. alternate: lfts. 5–9, stalked, usually subcordate: fr. berry-like, 1-seeded..3. *Tapiscia*

1. **STAPHYLÉA** L. Bladdernut. Deciduous shrubs or small trees; brts. with smooth striped bark; buds ovoid with 2 or 4 outer scales: lvs. opposite, 3–7-foliolate: lfts. serrulate; stipules deciduous: fls. in terminal panicles; sepals and petals usually of about equal length, whitish or pinkish, upright; stamens about as long as petals; carpels 2–3, usually connate below; styles 2–3, free or connate at apex; ovules many: fr. a. caps., inflated and membranous and usually 2–3-lobed; seeds few, globose obovoid, with bony lustrous testa and without aril. (Greek *staphyle*, grape; referring to the shape of the infl.) Eleven species in the temp. regions of the n. hemisphere. —Ornamental shrubs cult. for the handsome bright green foliage and the white or whitish fls.

A. Lfts. 5–7, occasionally 3: ovary and style glabrous.
B. Infl. raceme-like, pendulous, oblong: fl.-buds subglobose or obovoid: lfts. 5–7.
1. *S. pinnata*
BB. Infl. broad, paniculate: fl.-buds oblong-obovoid; sepals spreading: lfts. on flowering brts. usually 3.....2. *S. colchica*
AA. Lfts. 3.
B. Middle lft. on a slender stalk 1.5–4 cm. long: panicles stalked.
C. Fls. before the lvs.: fr. not lobed.....3. *S. holocarpa*
CC. Fls. after the lvs.: fr. 2–3-lobed.
D. Lfts. elliptic to ovate, pubescent beneath: stamens not exceeding the petals.
4. *S. trifolia*
DD. Lfts. broad-elliptic to suborbicular, glabrous: stamens longer than petals.
5. *S. Bolanderi*
BB. Middle lft. short-stalked: panicle sessile: fr. 2-lobed, compressed.....6. *S. bumalda*

1. **S. pinnàta** L. Upright shrub to 5 m.: lfts. 5–7, ovate-oblong, 5–10 cm. long, acuminate, sharply serrulate, glabrous and glaucescent beneath: fls. about 1 cm. long, in panicles 5–12 cm. long, on peduncles about 5 cm. long; sepals ovate, whitish, greenish at base, reddish at apex, upright; petals oblong: fr. subglobose, much inflated, 2–3-lobed, 2.5–3 cm. long; seeds brownish yellow, about 1 cm. long. Fl.v–vi; fr.ix–x. R.I.5:t.161,f.4823(c). F.D. 21:t.2182(c). G.H.t.36(c). H.W.3:52. Gn.34:280. C. and S. Eu. Cult. 1596. Zone V.

2. **S. cólchica** Stev. Upright shrub to 4 m.: lfts. usually 5, on flowering brts. 3, ovate-oblong, 5–8 cm. long, acuminate, sharply serrate, glabrous and lustrous beneath: fls. 1.2–1.5 cm. long, in panicles 5–10 cm. long and about as broad, upright and peduncled; sepals spreading, narrow-oblong, yellowish white; petals linear-spatulate, white; filaments glabrous: fr. obovoid, 2–3-lobed, much inflated, 4–8 cm. long; seeds about 8 mm. long. Fl.v–vi; fr.ix–x. B.M.7383(c). R.H.1870:257. G.C.III.10:161;59:320(h). Gt.24:837. Gn.76: 171. Cauc. Intr. 1850. Zone VI.—Var. **Kochiàna** Medwed. Filaments pubescent (var. *lasiandra* Dipp.)—Var. **laxiflòra** Baas-Beck. Lfts. usually 3: infl. longer and slenderer, pendulous; filaments pubescent at base; styles usually 2, spreading at apex. M.D.1921:127.—Var. **Coulombièri** Zabel. Of more vigorous growth; lvs. larger; lfts. long-acuminate; stamens glabrous: fr. 6–10 cm. long with spreading lobes. B.S.2:549. (*S. C.* André.) Cult. 1872.
S. c. × *pinnata* = **S. élegans** Zabel. Lfts. usually 5: panicles very large and nodding. Cult. 1871.—Var. **Héssei** Zabel. Fls. pinkish.

3. **S. holocárpa** Hemsl. Shrub or tree to 10 m.: lfts. 3, elliptic to oblong, 3–10 cm. long, acute to short-acuminate, serrulate, nearly glabrous: fls. white or pinkish, 1 cm. long, in pendulous slender-stalked panicles 3–10 cm. long, axillary on last year's brts.; ovary pubescent: fr. pear-shaped or ellipsoid, 3.5–5 cm. long, abruptly acuminate or sometimes lobed; seeds light grayish brown, lustrous, 6 mm. long. Fl.IV–V; fr.IX. B.M.9074(c). S.H.2:f.120c. C. China. Intr. 1908. Zone V.—Var. **rósea** Rehd. & Wils. Lfts. whitish-tomentulose beneath when young, later villous along the midrib: fls. pink, slightly larger.

4. **S. trifólia** L. Upright shrub to 5 m.: lfts. elliptic to ovate, 3.5–8 cm. long, acuminate, sharply and unequally serrulate, pubescent beneath, sometimes glabrate at maturity: fls. about 8 mm. long, in nodding panicles or umbel-like racemes; sepals greenish white; petals white, somewhat longer than sepals, style exserted; filaments pubescent below the middle; ovary pubescent: fr. usually 3-lobed, 3–4 cm. long; seeds yellowish, 5 mm. long. Fl.V; fr.IX. S.O.2:t.81(c). N.D.6:t.12(c). Gr.G.2:t.172. Gt.37:529. B.C.6:3227. (*S. trifoliata* West.) Que. to Ont. and Minn., s. to Ga. and Mo. Cult. 1640. Zone IV or III.—Var. **pauciflóra** Zabel. Low and suckering: lfts. smaller and broader, becoming glabrous: fls. in short, 3–8-fld. racemes. Cult. 1888.

A related species is **S. emódi** Wall. Lfts. elliptic to oblong, 5–14 cm. long, finely serrulate, pubescent or nearly glabrous beneath: fls. 12 mm. long in long-peduncled pendulous panicles: fr. 5–8 cm. long. Gt.37:528(l). S.H.2:f.120b(l). Himal. Cult. 1890. Zone VII.

5. **S. Bolánderi** Gray. Shrub: lfts. 3, broad-elliptic or suborbicular, 5–7 cm. long, acute, sharply serrulate, glabrous: fls. in 9–15-fld. nodding panicles, with subverticillate pedicels; stamens and style exserted; filaments glabrous: fr. inflated, 5–6 cm. long, 3-lobed with long-aristate lobes; seed 6 mm. long. Fl.IV–V; fr.VIII. G.F.2:545. R.H.1910:305. B.C.6:3228. M.O.122. Calif. Intr. 1879. Zone (V).

6. **S. bumálda** DC. Shrub to 2 m. with slender spreading brs.: lfts. 3, elliptic or elliptic-ovate, 3.5–6 cm. long, short-acuminate, cuneate, serrulate with mucronate teeth, light green, glabrous except puberulous on veins beneath; middle lft. on a stalk to 1 cm. long: fls. about 8 mm. long, in loose erect panicles 5–7 cm. long; sepals yellowish white, little shorter than the white petals; fr. usually 2-lobed, 1.5–2.5 cm. long, flattened; seed yellowish, lustrous, 5 mm. long. Fl.VI; fr.IX–X. S.Z.1:t.95. S.H.2:f.120a,121c. Japan. Intr. 1812. Zone V.

3. **EÙSCAPHIS** Sieb. & Zucc. Deciduous shrub or small tree, glabrous; buds with 2 outer scales: lvs. opposite, odd-pinnate, stipulate; lfts. serrulate; petiolulate, stipellate: fls. perfect, in terminal upright panicles; sepals, petals and stamens 5, of nearly equal length; ovary 2–3-celled, with 2 or 3 styles often connate at apex, surrounded at base by an annular disk: fr. consisting of 1–3 spreading leathery dehiscent pods, each with 1–3 seeds covered by a thin fleshy aril. (Greek *eu*, well, and *scaphis*, vessel; referring to the color and shape of the dehiscent pod.) One species.

E. japónica Dipp. Shrub to 3 m.: lfts. 7–11, lance-ovate, 4–8 cm. long, acuminate, rounded to broad-cuneate, appressed-serrulate: fls. yellowish green, about 5 mm. across, in broad many-fld. long-peduncled panicles 5–12 cm. across: pods 1–1.3 mm. long, reddish, apiculate; seeds suborbicular, 5–6 mm. across, steel-blue. Fl.V–VI; fr.VIII–IX. S.Z.1:t.67(c). S.I.t.70(c). S.H.2:f. 121e-i,122d. (*E. staphyleoides* Sieb. & Zucc. *Sambucus japonica* Thunb.)

Japan and C. China. Cult. 1890. Zone VIII.—Ornamental shrub planted chiefly for its handsome foliage and attractive fr.

4. **TAPÍSCIA** Oliv. Deciduous tree; buds with 2 or 3 outer pointed scales: lvs. alternate, odd-pinnate: lfts. short-petioluled, serrate, stipellate; stipules caducous: fls. very small, yellow, andro-dioecious, in axillary panicles; the staminate composed of long slender spikes with densely clustered fls.; the fertile ones much shorter with stouter brs. and with the fls. solitary in the axils of bracts; calyx-tubular-campanulate, 5-lobed; stamens 5, exserted; ovary superior with slender style exceeding the stamens; staminate fls. smaller and shorter with rudimentary ovary; fr. a 1-seeded ovoid drupe with thin fleshy epicarp. (Anagram of Pistacia.) One species.

T. sinénsis Oliv. Tree to 10 m., rarely to 25 m.; lfts. 5–9, ovate, 6–12 cm. long, acuminate, rounded to cordate at base, sharply serrate, glaucous beneath, glabrous; petiolules 3–10 mm. long: pistillate panicles 5–8, staminate 10–20 cm. long; pistillate fls. 2.5, staminate 1.5 mm. long, fragrant: fr. ovoid, 6–7 mm. long, black. Fl.VII; fr.IX. H.I.20:1928. S.H.2:f.607. Kew Bull. 1909:356(h). S.L.360(h). C. China. Intr. 1908. Zone VIII?—Ornamental tree with large handsome foliage turning yellow in autumn, and fragrant fls.

Fam. 56. ACERACEAE Lindl. MAPLE FAMILY

Trees or shrubs: lvs. opposite, simple or compound, estipulate: fls. bisexual or unisexual, mostly andro-polygamous, or andro-monoecious or dioecious, regular, small, in terminal or lateral racemes or panicles, sepals 4–5, imbricate, rarely connate, petals 4–5, imbricate or wanting; disk usually flat, intrastaminal or extrastaminal, rarely wanting; stamens 4–10, usually 8: ovary superior, 2-celled and 2-lobed, much flattened contrary to the partition; style with 2 stigmas; ovules 2 in each cell: fr. flat, winged, splitting into two 1-seeded samaras; seed exalbuminous, with thin testa; embryo with flat, folded or rolled cotyledons.—Two genera with about 115 species chiefly in the temp. regions of the n. hemisphere.

A. Samara winged all around, with the seed near the middle: lvs. pinnate, 7–15-foliolate. 1. *Dipteronia*

AA. Samara winged only on one side: lvs. simple or 3–7-foliolate. . . . . 2. *Acer*

1. **DIPTERÒNIA** Oliv. Deciduous trees; winter-buds small, naked, densely pubescent: lvs. opposite, odd pinnate; lfts. serrate: fls. andro-monoecious, in large upright terminal panicles; sepals 5, longer than the short broad petals; staminate fls. with usually 8 stamens, an extrastaminal disk and a rudimentary ovary; filaments slender; fertile fls. with a 2-celled compressed ovary: fr. consisting of 2 compressed nutlets connate only at base and winged all around. (Greek *dis*, twice, and *pteron*, wing; referring to the winged carpels of the fr.) Two species in China.

D. sinénsis Oliv. Tree to 10 m.: lvs. 20–30 cm. long; lfts. usually 9–13, short-stalked, the upper ones subsessile, oblong-ovate to lance-oblong, the lowest pair sometimes 3-parted or 3-foliolate, 4–10 cm. long, long-acuminate, broad-cuneate, coarsely serrate, glabrous or sparingly pubescent beneath when young; panicle glabrous, 15–30 cm. long: fls. whitish, about 2.5 mm. across, slender-pedicelled: each samara broad-obovate or nearly orbicular, 2–2.5 cm. broad, light brown. Fl.VI; fr.IX. H.I.19:1898. J.L.28:f.18. G.C. III.72:139. Gn.89:449. C. China. Intr. 1900. Zone VII?—Ornamental tree with handsome large foliage and peculiar fr.,

ÁCER L. Maple. Deciduous, rarely evergreen trees, rarely shrubs; winter-buds with imbricate or with 2 outer scales: lvs. opposite, petioled, simple and usually palmately lobed or 3–7-foliolate: fls. usually andro-monoecious or dioecious, 5-merous, rarely 4-merous, in racemes, panicles or corymbs; sepals sometimes connate; petals sometimes wanting; disk usually annular and large, rarely lobed or wanting; stamens 4–10, usually 8; styles or stigmas 2: fr. consisting of 2 long-winged compressed samaras (keys). (The ancient Latin name of the tree.) Including *Negundo* Ludw., *Rulac* Adans. and *Crula* Nieuwl. About 115 species in N. Am., Asia, Eu. and N. Afr.—Ornamental trees chiefly planted for their handsome foliage usually assuming brilliant colors in autumn; some with attractive fls. or frs.

I. Lvs. simple (occasionally 3-foliolate in No. 28).

Infl. terminal on short leafy brts. (in Nos.45–46 the staminate from lateral leafless buds).
- A. Infl. corymbose or paniculate, andro-monoecious; disk extrastaminal.
  - B. Lvs. palmately lobed or simple and doubly serrate.
    - C. Lobes of lvs. entire or coarsely dentate; winter-buds with imbricate scales.
      - D. Infl. corymbose.
        - E. Sepals and petals distinct.
          - F. Lobes of lvs. acuminate: fr. with flattened nutlets and leathery scarcely veined walls.
            - G. Bark of mature brts. gray or grayish brown, slightly fissured and lenticellate.
              - H. Lobes of lvs. coarsely toothed.
                - I. Lvs. glabrous and lustrous beneath; lobes finely pointed ..... 1. *A. platanoides*
                - II. Lvs. pubescent beneath; lobes bluntly pointed ..... 2. *A. Miyabei*
              - HH. Lobes of lvs. entire or rarely with few teeth.
                - I. Lvs. truncate at base: wings of fr. about as long as nutlet. ..... 3. *A. truncatum*
                - II. Lvs. usually subcordate at base; wings about twice as long as nutlet. ..... 4. *A. pictum*
            - GG. Bark of brts. smooth and lustrous for several years: lobes of lvs. entire or with few teeth.
              - H. Lvs. glabrous beneath.
                - I. Lvs. usually 3–5-lobed with broad and short lobes: fr. with upright incurved wings ..... 5. *A. Mayrii*
                - II. Lvs. 5–7-lobed, rarely 3-lobed: fr. with spreading wings. ..... 6. *A. cappadocicum*
              - HH. Lvs. pubescent beneath, 3-lobed: fr. with spreading wings. ..... 7. *A. longipes*
          - FF. Lobes of lvs. obtusish or acutish: fr. with convex strongly veined nutlets.
            - G. Lvs. 2–8 cm. across, usually 3-lobed.
              - H. Wings of fr. horizontally spreading: lvs. 3–5-lobed, pubescent and light green beneath, lobes usually dentate ..... 9. *A. campestre*
              - HH. Wings of fr. parallel or spreading at right angles.: lvs. chartaceous, glabrous.
                - I. Lvs. 3-lobed, glaucous beneath ..... 10. *A. monspessulanum*
                - II. Lvs. often without lobes, green beneath ..... 11. *A. orientale*
            - GG. Lvs. 6–14 cm. across, usually 5-lobed, lobes irregularly dentate: infl. pendulous.
              - H. Lvs. shallowly lobed with broad-ovate lobes, pubescent beneath. ..... 11. *A. Opalus*
              - HH. Lvs. deeply lobed, lobes angular with parallel margins, glabrous or nearly so beneath ..... 12. *A. hyrcanum*
        - EE. Sepals connate; petals wanting: fls. corymbose with slender pendulous pedicels.
          - F. Lvs. glaucous or pale beneath or green and glabrous.
            - G. Lvs. usually glabrous and sometimes green beneath, rarely villous, lobes entire or with few coarse teeth: corymb subsessile ..... 13. *A. saccharum*
            - GG. Lvs. pubescent beneath, the lobes distinctly lobulate: corymb short-stalked. ..... 14. *A. grandidentatum*
          - FF. Lvs. green and pubescent beneath, rarely glabrous.
            - G. Lvs. pilose-pubescent beneath, 8–14 cm. across, the basal sinus often closed: bark dark and furrowed ..... 15. *A. nigrum*
            - GG. Lvs. soft-pubescent beneath, rarely glabrous, 5–8 cm. across; the basal sinus open: bark gray ..... 16. *A. leucoderme*
      - DD. Infl. paniculate: fr. with convex strongly veined nutlets.
        - E. Panicles pendulous.
          - F. Fr. hispid: lvs. 20–30 cm. long, deeply lobed ..... 17. *A. macrophyllum*
          - FF. Fr. glabrous: lvs. 10–15 cm. long ..... 18. *A. pseudoplatanus*
        - EE. Panicles upright.
          - F. Lvs. 5-lobed, large.
            - G. Middle lobe divided nearly to base ..... 19. *A. Heldreichii*

GG. Middle lobe reaching to the middle or little beyond.
H. Lobes longer than broad; lvs. glaucescent beneath...20. *A. Trautvetteri*
HH. Lobes about as long as broad; lvs. green beneath.....21. *A. insigne*
FF. Lvs. 3-lobed, often mixed with undivided ones, 5–8 cm. long.
22. *A. Buergerianum*
CC. Lobes of lvs. or lvs. serrate or doubly serrate: nutlets of fr. convex and strongly veined.
D. Winter-buds with imbricate scales: lvs. undivided or 3-lobed, doubly serrate.
E. Lvs. lustrous dark green, usually with 2 lobes near base.....23. *A. ginnala*
EE. Lvs. dull and rather light green, not lobed.....24. *A. tataricum*
DD. Winter-buds with only 1 pair of outer valvate scales.
E. Fls. in panicles.
F. Panicles narrow, spike-like, upright; lvs. 3–7-lobed, doubly serrate.
G. Lvs. 3- or rarely 5-lobed, pubescent beneath.....25. *A. spicatum*
GG. Lvs. 5–7-lobed, glabrous or pubescent beneath.....26. *A. caudatum*
FF. Panicle short, only little longer than broad: lvs. 5-lobed, serrulate.
G. Lobes irregularly and sparingly serrulate.....27. *A. sinense*
GG. Lobes finely and sharply serrulate.....28. *A. Oliverianum*
EE. Fls. in few-fld. corymbs.
F. Lvs. 5–11-lobed, green beneath.
G. Petioles and peduncles glabrous: ovary glabrous; sepals purplish.
H. Lvs. divided to about the middle into 7–9 lobes: petals white; sepals purple.....29. *A. circinatum*
HH. Lvs. divided to beyond the middle into 5–9 lobes; petals purplish.
30. *A. palmatum*
GG. Petioles and peduncles pubescent, at least while young: ovary villous.
H. Fls. yellowish; anthers scabrid: lvs. subcordate or cordate with 7–9 doubly serrate lobes.....31. *A. Sieboldianum*
HH. Fls. purple; anthers smooth: lvs. deeply cordate with 7–9 incisely serrate lobes.....32. *A. japonicum*
FF. Lvs. 3-lobed or 3-foliolate, pale and glaucescent beneath, glabrous.
33. *A. glabrum*
BB. Lvs. undivided, entire or serrulate: infl. paniculate. (See also Nos. 11 and 24.)
C. Lvs. oblong, rounded at base, entire.....34. *A. oblongum*
CC. Lvs. ovate, cordate at base, serrulate.....35. *A. distylum*
AA. Infl. racemose, with fls. of one kind; disk intrastaminal.
B. Lvs. oblong, doubly serrate with about 20 pairs of veins: fls. apetalous; winter-buds with many imbricate scales.....36. *A. carpinifolium*
BB. Lvs. lobed or undivided with about 10 pairs of veins or less: winter-buds with 2 outer valvate scales.
C. Sepals and petals 5; racemes of both sexes on leafy brts.
D. Lvs. oblong-ovate, undivided or with 2 lobes near base: brts. striped white.
E. Lvs. not lobed, crenate-serrate.....37. *A. Davidi*
EE. Lvs. with 2 lobes near base, the middle lobe elongated....38. *A. crataegifolium*
DD. Lvs. 5–7-lobed or 3-lobed at apex.
E. Lvs. 3-lobed above the middle, broad-obovate or ovate: brs. striped.
F. Lvs. ferrugineous-pubescent beneath when young.
G. Young brts. not bloomy: young lvs. brownish villous beneath, the primary veins glabrescent.....39. *A. pensylvanicum*
GG. Young brts. bloomy: young lvs. densely rufous-pubescent on the veins beneath.....40. *A. rufinerve*
FF. Lvs. glabrous beneath.
G. Pedicels slender, about 1 cm. long: lvs. reddish when unfolding.
41. *A. capillipes*
GG. Pedicels short: young lvs. bright green.....42. *A. tegmentosum*
EE. Lvs. 5–7-lobed.
F. Lvs. rufous-pubescent on the veins beneath at least when young.
43. *A. Tschonoskii*
FF. Lvs. glabrous beneath.....44. *A. micranthum*
CC. Sepals and petals 4; staminate fls. clustered, from leafless lateral buds.
F. Lvs. 5-lobed, roundish-ovate.....45. *A. argutum*
FF. Lvs. undivided or slightly lobed, ovate to oblong-ovate....46. *A. tetramerum*

Infl. from lateral leafless buds: fls. andro-monoecious or dioecious: winter-buds with imbricate scales.

A. Fls. racemose or the staminate corymbose, with the lvs.: disk intrastaminal.
B. Sepals more or less connate, petals wanting in the staminate fl.: lvs. 5-lobed.
47. *A. diabolicum*
BB. Sepals and petals distinct; fls. of both sexes racemose: lvs. 3-lobed.....48. *A. Francheti*
AA. Fls. fascicled, before the lvs.
B. Lvs. 3–5-lobed with unequally or crenately serrate lobes: fls. slender-stalked; ovary glabrous.....49. *A. rubrum*
BB. Lvs. 5-lobed with deeply serrate or lobulate lobes: fls. short-stalked, apetalous: ovary pubescent.....50. *A. sacharinum*

II. Lvs. 3–7-foliolate

A. Fls. in terminal corymbs, after the lvs.; disk large, extrastaminal: winter-buds with many imbricate scales: lfts. 3.
B. Petioles, lfts. beneath and corymbs pilose.

cc. Lfts. elliptic-oblong, sparingly serrate, 5–12 cm. long; bark close.....51. *A. nikoense*
cc. Lfts. elliptic, coarsely dentate, 2–5 cm. long; bark flaky.....52. *A. griseum*
bb. Petioles, lfts. and corymbs glabrous: lfts. lance-oblong.....53. *A. mandshuricum*
aa. Fls., at least the pistillate ones, in long racemes; disk small or wanting: winter-buds with 2 outer valvate scales.
b. Petals present: fls. of both sexes in racemes, sometimes leafy at base: lfts. 3.
c. Petioles and lfts. beneath pubescent, rarely glabrous: fls. 5-merous; pedicels short. 54. *A. Henryi*
cc. Petioles and lfts. glabrous: fls. 4-merous; pedicels long and slender.55. *A. cissifolium*
bb. Petals wanting: pistillate fls. in pendulous racemes, staminate ones corymbose, before the lvs.: lfts. 3–7.....56. *A. Negundo*

Group I. Platanoidea Pax. Fls. andro-polygamous, corymbose (broad-paniculate in No. 2); staminate fls. perigynous; stamens inserted on the middle of the disk: fr. with much flattened nutlets and leathery scarcely veined walls: lvs. 3–5-lobed with coarsely sinuate-dentate or entire lobes, rarely entire; leaf-stalk with milky juice: winter-buds with imbricate scales.

1. **A. platanoìdes** L. Norway M. Tree to 30 m.; glabrous: lvs. 5-lobed, 10–18 cm. across, lobes acuminate, remotely dentate with pointed teeth, bright green and lustrous beneath, bearded in the axils of the veins: fls. greenish yellow, 8 mm. across in erect many-fld. stalked corymbs: fr. pendulous, with nearly horizontally spreading wings, 3.5–5 cm. long, including the flattened nutlet. Fl.iv–v; fr.ix–x. R.I.5:t.164(c). F.D.16:t.1526(c). H.W.3:t.45(c). E.N.III.5:264. E.H.3:t.186–188(h). S.L.t.8(hc). Eu., Cauc. Long cult. Zone IV.—Var. **variegàtum** West. Lvs. with large white blotches. S.O.1:t.4(c). (Var. *albo-variegatum* Hayne.) Cult. 1770.—Var. **aureo-marginàtum** Pax. Lvs. with yellow margin, sometimes irregularly blotched. —Var. **rúbrum** Herd. Lvs. greenish red when unfolding, turning dark red in late summer. Gt.16:545,t(c). B.H.18:39,t(c). (Var. *Reitenbachii* Nichols.) Cult. 1867.—Var. **Schwédleri** K. Koch. Lvs. bright red, when young, changing to dark green. R.B.32:197,t,f.6(c). Cult. 1870.—Var. **Stóllii** Spaeth. Lvs. large, usually 3-lobed, with entire lobes, purple when unfolding. Gt.42:585. S.H.2:f.155f.—Var. **laciniàtum** Ait. Eagle's Claw M. Of upright columnar habit: lvs. cuneate, irregularly lobed, the lobes curved downward, clawlike. S.O.1:t.5(c). Gt.42:584. Cult. 1789.—Var. **palmatífidum** Tausch. Lvs. palmately divided nearly to the base, the divisions deeply lobed, dark green. Gt.42:584. (Var. *dissectum* Schwer.)—Var. **Lorbérgii** Van Houtte. Lvs. palmately divided like the former, but tips ascending from plane of lf., light green, Gt.42:584. (Var. *palmatum* Bean.)—Var. **columnàre** Carr. Of columnar habit with upright brs.: lvs. smaller, less deeply lobed. Orig. about 1855.—Var. **globòsum** Nichols. Forming a dense globose head. M.G.18:189(h). G.W.5: 14(h). S.L.86(h).—Ornamental tree planted for its good habit and bright green foliage turning yellow in autumn.

A. p. × *Lobelii* = **A. Dièckii** Pax. Similar to *A. p.*, but lobes entire. S.H.2: f.152a. D.H.2:451(l). (*A. platanoides* var. *integrilobum* Zabel.)

2. **A. Miyàbei** Maxim. Tree to 12 m.; brs. with slightly corky bark, pubescent when young: lvs. 5-lobed, 10–15 cm. across, deeply cordate, lobes obtusely acuminate, obtusely lobulate or dentate, pale green and pubescent beneath, pubescent above when young; petioles puberulous; fls. greenish yellow, in slender-stalked 10–15-fld. pyramidal corymbs: wings of fr. horizontally spreading with the flattened velutinous nutlet 4–5 cm. long. Fl.v; fr.ix. S.I.2:t.45(c). G.F.6:143. B.C.1:198. J.C.32,1:t.31. J.H.29:f.80(h). Japan. Intr. 1892. Zone V.—Ornamental tree of rather open habit, doing well in cult.

3. **A. truncàtum** Bge. Small tree to 8 m.; glabrous: lvs. deeply 5-lobed, 6–10 cm. across, truncate at base, lobes acuminate, setosely pointed, entire or the middle lobe sometimes 3-lobed; bright green: fls. greenish yellow, about

1 cm. across, slender-stalked, in erect corymbs 6–8 cm. across: wings of fr. spreading at a right or an obtuse angle, with the compressed nearly smooth nutlet about 3 cm. long, the broad wing about as long as nutlet. Fl.v; fr.ix. S.T.1:t.76. S.H.2:f.150ad(l). N. China. Intr. 1881. Zone V.—Small round-headed tree with graceful foliage purplish when unfolding.

4. **A. pictum** Thunb. Tree to 20 m.; brts. glabrous, becoming yellowish to light gray and slightly fissured the second year: lvs. 5–7-lobed, 8–15 cm. across, cordate or subcordate, with ovate-triangular acuminate entire lobes, green and glabrous beneath except axillary tufts of hairs: fls. greenish yellow, in corymbs 4–6 cm. across: wings of fr. upright, often connivent, about 1½ times as long as the compressed nutlet and with the nutlet 2–3 cm. long. Fl.iv–v; fr.ix. S.I.1:t.65(c). J.C.32,1:t.32. S.H.2:f.150e,151d-f. Manch., Japan. Intr. 1865. Zone V.—Var. **marmorátum** Nichols. Lvs. densely dotted and stained white. This is probably the type of the species.—Var. **parvifólrum** Schneid. Lvs. more cordate at base: wings of fr. spreading at an obtuse angle or nearly horizontal. C.C.229. N.K.1:t.12. J.H.29:f.87(h),89. (*A. mono* Maxim., *A. pictum* var. *m.* Pax.) China, Korea. Intr. about 1880. Zone V.—Var. **tricúspis** Rehd. Lvs. smaller, 3-lobed. Intr. 1901.—Var. **ambíguum** Pax. Lvs. pilose beneath: fls. and fr. unknown. D.H.2:458. (*A. a.* Dipp., *A. Dippelii* Schwer.) Doubtful form of unknown origin.—Handsome round-headed tree with bright green lvs.

A closely related species is **A. fulvéscens** Rehd. Lvs. usually 3-lobed, 5–10 cm. across, yellowish or fulvous pubescent beneath, particularly on the veins: keys 3 cm. long. C. China. Intr. 1908. Zone V.

5. **A. Maỳrii** Schwerin. Tree to 25 m.; brts. glabrous and usually bloomy when young, smooth and lustrous, yellowish or red-brown the second year: lvs. 3–5-lobed, 8–15 cm. across, truncate or rounded at base, with short, entire broad-ovate and abruptly acuminate lobes sometimes very short and almost reduced to a narrow acumen, green and glabrous and reticulate beneath: fls. greenish white, in corymbs 4–6 cm. across: wings of fr. upright and incurved or slightly spreading, 1½ or 2 times as long as the compressed nutlet and with it 2.5–4 cm. long. Fl.iv–v; fr.ix. Mayr, Wald- & Parkb.440. S.H.2:f.150ag. (*A. pictum* var. *M.* Henry.) Japan. Intr. 1916. Zone V.

6. **A. cappadócicum** Gleditsch. Tree to 20 m.; brts. sometimes bloomy when young, lustrous and green the second year: lvs. 5–7-lobed, usually cordate at base, 8–14 cm. across, lobes triangular-ovate, long-acuminate, entire, green and finely reticulate beneath and glabrous except axillary tufts of hairs; petiole to 10, occasionally to 20 cm. long: fls. pale yellow, small, in glabrous corymbs: wings of fr. spreading at a wide angle, 2–4 times as long as the compressed nutlet, with it 3–5 cm. long. Fl.v–vi; fr.ix. D.H.2:456(l). Gt.1887:433(l). S.H.2:f.150ah,f.151h-k. (*A. laetum* C. A. Mey., *A. pictum* var. *colchicum* Hort.) Cauc. and W. Asia to Him. Intr. 1838. Zone V or VI.—Var. **rúbrum** Nash. Lvs. blood-red when unfolding, becoming green. (*A. laetum* var. *r.* Rupr., *A. colchicum* var. *r.* Booth, *A. laetum* var. *horticola* Pax.) Intr. 1838.—Var. **trícolor** Rehd. Lvs. blood-red and sprinkled with rosy pink when young. (*A. laetum* var. *t.* Schwer.)—Var. **sínicum** Rehd. Lvs. usually 5-lobed, subcordate to truncate at base, 6–10 cm. across; wings about 2 times as long as nutlet. S.H.2:f.150ai(l). J.H.29:f.101(l) (as *A. laetum* var. *cultratum*). China. Intr. 1901. Zone V.—Var. **tricaudátum** Rehd. A form of the preceding var. with smaller 3-lobed lvs. J.H.29:f.100(h), 102(l). S.H.2:f.150ak(l). Intr. 1901.

A related species is **A. Lobèlii** Ten. Tree to 20 m. with ascending brs.; young brts. bloomy: lvs. usually 5-lobed, 10–16 cm. across, lobes long-acuminate, usually

pointing forward, dark green above, slightly paler beneath: fls. small; calyx outside and pedicels pilose: wings of fr. spreading at a wide angle, about 1½ times as long as nutlet, with it 2.5–3 cm. long. Atti Acad. Napol.3:t.1. D.H.2:453. S.H.2:f. 152f-g,153g-h. R.H.1915:524(h). Italy. Intr. before 1838. Zone VII?—*A. L.* × *platanoides* = *A. Dieckii;* see under No. 1.—*A. L.* × *campestre* = *A. zoeschense;* see under No. 10.

7. **A. lóngipes** Rehd. Tree to 10 m.; young brts. glabrous, green, bark remaining smooth: lvs. 3-, rarely 5-lobed, 10–16 cm. across, with long-acuminate entire lobes, occasionally mixed with undivided ovate lvs., light green and soft-pubescent beneath: fls. in glabrous short-peduncled or nearly sessile loose corymbs about 10 cm. across: wings of fr. spreading at a right angle, about twice as long as nutlet, with it 2.5–3 cm. long. Fl.v–vi; fr.ix. S.H.2: f.152c(l). W. China. Intr. 1900. Zone VI–VII.—Tree with handsome large lvs. purplish when unfolding.

A related species is **A. catalpifólium** Rehd. Lvs. ovate to ovate-oblong, 10–20 cm. long, undivided or with 2 short rounded lobes near base, abruptly acuminate, light green and glabrous and finely reticulate beneath: corymbs large and loose, sessile: wings of fr. spreading at a very wide angle, about 3 times as long as nutlet, with it 4–5 cm. long. W. China. Intr. 1910. Zone VII?

Group II. Campestria Pax. Fls. andro-polygamous, on slender often pendulous pedicels, in corymbs; staminate fls. perigynous; stamens inserted near inner margin of disk; nutlet convex with thick strongly veined walls: lvs. 3–5-lobed, with entire or coarsely dentate, rarely crenulate, obtusish lobes, rarely undivided; petiole with milky juice in No. 10: winter-buds with several imbricate scales.

9. **A. orientàle** L. Deciduous or half-evergreen shrub or small tree to 5, rarely 12 m.; brts. glabrous: lvs. ovate or sometimes 3-lobed, 2–5 cm. long, obtuse or acutish, entire or slightly crenulate-denticulate, bright green and glabrous beneath, coriaceous; petiole 3–10 mm. long: fls. in few-fld. upright glabrous corymbs about 2 cm. long: wings of fr. parallel or spreading at a right angle, with the nutlet 1–1.5 cm. long. S.F.4:t.361(c). E.P.IV.163:64. S.H.2:f.159k-o. (*A. creticum* L., *A. sempervirens* L., *A. heterophyllum* Willd.) E. Mediterr. region. Intr. 1756. Zone VII?

A related species is **A. cinerascens** Boiss. Young brts. pubescent: lvs. 3-lobed, sometimes with 2 additional basal lobes, 2–6 cm. long, with acutish or obtuse, entire or crenulate lobes, pubescent beneath: fr. with upright wings. M.D.1898: 47,t. S.H.2:f.158f,159e-f. W. Asia. Cult. 1896. Zone VII?

9. **A. monspessulànum** L. Shrub or round-headed tree to 8 or 12 m.; brts. glabrous: lvs. 3-lobed, 3–8 cm. across, lobes triangular-ovate, entire or sparingly denticulate, lustrous above, glaucescent and reticulate beneath and glabrous except axillary tufts of hairs, subcoriaceous: fls. greenish yellow, slender-pediceled and soon drooping, in several-fld. glabrous corymbs; ovary pubescent: fr. reddish; wings upright and often overlapping or slightly spreading, with the nutlet 2–2.5 cm. long. Fl.v; fr.ix. S.O.1:t.14(c). R.I. 5:t.162(c). F.D.16:t.1528(c). H.W.3:46. E.H.3:t.190(h). G.W.8:195(h). (*A. trilobatum* Lam.) S. Eu., W. Asia. Intr. 1739. Zone V.—Lvs. remaining green until late in autumn.

A. m. × *campestre* = *A. Bornmuelleri;* see under No. 10.—*A. m.* × *opalus* = *A. Peronai;* see under No. 11.—*A. m.* × *pseudoplatanus* = *A. coriaceum;* see under No. 18.—*A. m.* × *tataricum* = *A. pusillum;* see under No. 24.

10. **A. campéstre** L. Round-headed tree to 12 or sometimes 25 m.; young brts. pubescent or glabrous, often becoming slightly corky: lvs. 3–5-lobed, 5–10 cm. across, with broad obtuse entire lobes or the middle one 3-lobed, dull green above, pubescent beneath; petiole about as long as blade, with milky juice: fls. greenish, in several-fld. upright pubescent corymbs: fr. usually pubescent; wings spreading horizontally, with the flattened nutlet 2.5–3 cm. long. Fl.v; fr.viii–ix. S.E.2:t.321(c). R.I.5:t.162(c). F.D.16:t.1527(c).

H.W.3:45(h),t.46(c). E.H.3:t.184, 185(h). Eu., W. Asia. Cult. Zone V or IV.—Var. **hebecárpum** DC. Fr. pubescent. The typical form.—Var. **pulverulèntum** Kirchn. Lvs. densely speckled white: fr. glabrous.—Var. **albovariegàtum** Hayne. Lvs. with large white blotches.—Var. **postelénse** Lauche. Lvs. golden yellow when young: fr. glabrous.—Var. **Schwerìnii** Hesse. Lvs. purple when young: fr. glabrous.—Var. **leicárpum** Tausch. Fr. glabrous.—Var. **austríacum** DC. Usually a tree: lvs. 5-lobed, with acute, nearly entire lobes, glabrate beneath: fr. glabrous. F.E.19:t.98(h).—Var. **taùricum** Kirchn. Lvs. 5-lobed, with lobulate lobes, pubescent beneath: fr. pubescent. S.H.2:f. 156c. (Var. *lobatum* Pax.)—Handsome small tree; the lvs. turning yellow in autumn.

A. c. × *monspessulanum* = **A. Bornmuèlleri** Borb. Lvs. 3–5-lobed, 5–6 cm. across, cordate, glabrous: wings of fr. horizontal, with the convex nutlets 2.5 cm. long. S. E. Eu. Intr. ?—*A. c.* × *Lobelii* = **A. zoeschénse** Pax. Young brts. finely pubescent: lvs. 5-lobed, 8–12 cm. across, cordate, lobes ovate, long-acuminate, lustrous dark green above, paler and pubescent beneath, becoming glabrous: fr. puberulous; wings nearly horizontal, with the nutlet 3 cm. long. Bot. Tidsskr. 19:266. S.H.2:f.152b(l). (*A. neglectum* Lge., not Hoffm., *A. aetnense* Hort., *A. c.* × *laetum* Pax.) Cult. 1880. Zone V.—*A. c.* × *?pseudoplatanus* = *A. ramosum;* see under No. 18.

11. **A. ópalus** Mill. Small tree to 10 m. or 15 m.; brts. glabrous: lvs. shallowly 5-lobed, 6–10 cm. across, cordate or truncate, with short and broad usually acutish obtusely dentate lobes, the middle one often 3-lobed, dark green and glabrous above, glaucescent beneath and pubescent at first, becoming glabrous; petiole 4–9 cm. long: fls. yellow, on slender drooping glabrous pedicels in a many-fld. short-stalked corymb: fr. glabrous; wings spreading at a right angle or connivent, with the thick nutlet 2.5–3.5 cm. long. Fl. IV–V; fr. VIII–IX. R.I.5:t.163(c). L.B.1221(c). E.H.3:t.189(h). (*A. italum* Lauth, *A. opulifolium* Vill.) S. Eu. Intr. 1752. Zone V or VI.—Var. **obtusàtum** Henry. Lvs. usually larger, 8–12 cm. across, cordate, the lobes shorter, obtusish or obtuse, the basal ones very short, often nearly obsolete, soft-pubescent beneath: pedicels pilose, glabrescent at maturity. R.I.5:t.163,f. 4827(c). D.H.2:443. G.C.III.75:239. E.H.3:t.206,f.16. (*A. o.* Kit., *A. o.* var. *tomentosum* Schwer., *A. opulifolium* var. *o.* Vis.) S. E. Eu. and Italy. Intr. about 1805. Zone VI.—Var. **tomentôsum** Rehd. Lvs. to 16 cm. across, cordate, lobes short and more rounded, tomentose beneath: pedicels pilose until autumn: wings of fr. broader. R.I.5:t.165(c). D.H.2:444. E.H.3:t.206, f.14. (Var. *neapolitanum* Henry, *A. neapolitanum* Ten.) Italy. Intr. 1825. Zone VI.—Probably another var. of this species is *A. microphyllum* Kirchn. Dwarf shrub with small glabrous lvs. only about 3 cm. across. M.D.1894: 47(l). Cult. 1865.

A. o. × *monspessulanum* = **A. Perônai** Schwer. Lvs. 3-lobed, sometimes with small basal lobes, 5–10 cm. across, cordate, lobes triangular, coarsely and sparingly dentate, glaucescent and glabrous beneath. Italy and France. Cult. 1905. Zone V.—*A. o.* var. *obtusatum* × *? monspessulanum* = **A. velutìnum** Schwer. Lvs. 3-lobed with obscurely lobed or entire lobes sometimes with parallel margins, tomentose beneath: infl. pendulous; fls. large, yellow. M.D.1894:47(l). Cult. 1894.—*A. ?o.* × *pseudoplatanus* = *A. hybridum;* see under No. 18.—*A. o.* var. *obtusatum* × *pennsylvanicum* = *A. crassipes;* see under No. 39.

12. **A. hyrcànum** Fisch. & Mey. Tree to 10 m.; brts. glabrous: lvs. 5-lobed, 5–10 cm. across, lobes angular, acute, coarsely dentate, the 3 upper ones with nearly straight and parallel margins and often 3-lobed, bright green above, glaucescent beneath and pubescent along the veins; petiole red, slender, 5–10 cm. long: fls. greenish yellow on slender glabrous pendulous pedicels: fr. glabrous; wings nearly upright and 2–2.5 cm. long with the

nutlets. Fl.v; fr.ix. Gt.42:361(l). D.H.2:446(l). (*A. italum* var. *h.* Pax, *A. opalus* var. *h.* Rehd., *A. tauricum* Hort.) S. E. Fu. Cult. 1865.

Group III. Saccharina Pax. Fls. andro-polygamous or sometimes andro-dioecious, on slender pendulous pedicels, fascicled or corymbose, perigynous; sepals connate; petals wanting; stamens inserted on the inner margin of the disk: fr. with convex veined nutlets spreading horizontally, the wings more or less upright: lvs. 3–5-lobed, the lobes entire or coarsely dentate: winter-buds with many imbricate scales.

13. **A. sáccharum** Marsh. Sugar M. Tree to 40 m., with gray furrowed bark: lvs. 3–5-lobed, 8–14 cm. across, cordate, lobes acuminate, sparingly coarsely dentate with narrow and deep sinuses, light green and glabrous beneath in the typical form: fls. campanulate, about 5 mm. long, greenish yellow on pendulous hairy pedicels 3–7 cm. long in subsessile corymbs; stamens exserted in the staminate fl.: fr. with slightly divergent wings, with the nutlet 3.5–4 cm. long, glabrous. Fl.iv; fr.ix. M.S.1:t.42(c). S.O.1:t.8(c). Em.2:558,t. S.S.2:t.90. Am. For. 26:87(h);28:12–16. F.L.5:56,t(h). G.F.4: 175(h). E.H.3:t.191(h). (*A. barbatum* Michx., *A. palmifolium* Borkh., *A. sacharinum* Wangh., not L., *Saccharodendron barbatum* Nieuwl.—Rock M.) E. Can. to Ga., Ala., Miss. and Tex. Intr. 1753. Zone III.—Var. **monumentàle** Schwer. Of columnar habit with ascending brs. and short brts. H.B.1:269(h). (*A. nigrum* var. *m.* Rehd.) Cult. 1900.—Var. **glaûcum** Pax. Lvs. glaucous beneath. (*A. sacharinum* var. *glaucum* Schmidt.)—Var. **Schnéckii** Rehd. Lvs. densely villous on the veins beneath. Ind., Ill., Mo. Intr. 1919.—Var. **Rugèlii** Rehd. Lvs. usually 3-lobed, generally broader than long, with entire lobes, glaucous or sometimes pale green beneath, subcoriaceous. (*A. R.* Pax, *A. saccharum* var. *barbatum* Trel.) S.S.2:t.91 (as var. *nigrum*). Intr. 1903.—Much planted as a street and shade tree in the N. E. States; of dense regular habit and with bright green lvs. turning yellow or orange and scarlet in autumn; yields maple sugar.

The incompletely known *A. hispidum* Schwerin is perhaps a var. of *A. saccharum* with hispid lvs. and petioles. Cult. 1894.

14. **A. grandidentàtum** Nutt. Tree to 12 m., with dark brown scaly bark; brts. glabrous: lvs. 3–5-lobed, with broad shallow sinuses, 5–8 cm. across, subcordate, lobes acute or obtuse, lobulate, rarely entire, glaucescent and pubescent beneath especially on the veins; petiole stout, 3–5 cm. long: fls. on slender drooping villous pedicels in several-fld. short-stalked corymbs: calyx often persistent under the fr.: wings spreading, often rose-colored in midsummer, with the nutlet 2.5–3.5 cm. long. Fl.iv; fr.ix. N.S.2:t.69(c). S.S.2:t.92. D.H.2.440. (*A. saccharum* var. *g.* Sudw.) Wyo. to Utah, N. Mex. and n. Mex. Intr. 1882. Zone V.

A related spec~~ies~~ is **A. floridànum** Pax. Bark of young trees pale and smooth: lvs. 3–5-lobed, truncate or subcordate, with entire or slightly lobulate acute or obtuse lobes, glaucescent and pubescent beneath: fls. in many-fld. nearly sessile corymbs: fr. sparingly villous while young with spreading or sometimes erect wings with the nutlet 2.5–3 cm. long. Va. to Fla. and E. Tex. S.S.2:t.91. G.F.4:148. (*A. saccharum* var. *f.* Sudw.) Intr. ? Zone VII?

15. **A. nígrum** Michx. Black M. Tree to 40 m., with black deeply furrowed bark; brts. pilose at first, soon glabrous: lvs. 3-lobed, occasionally 5-lobed, 10–14 cm. wide, deeply cordate with usually closed sinus, lobes acute, entire or obtusely toothed, the sides of the blade drooping, dull green above, yellowish green or pilose beneath; petioles pubescent, 8–12 cm. long: fls. yellowish green, on pendulous hairy pedicels in nearly sessile many-fld. corymbs: fr. glabrous; wings nearly upright or diverging, with the nutlet 3–4 cm. long. Fl.iv; fr.ix. M.S.1:t.43(c). S.S.13:t.625. H.H.326, 327(b). B.C.1:203. (*A.*

saccharum var. *n.* Brit., *A. saccharinum* var. *n.* Loud.) Que. and N. E. to N. Y., W. Va. and Ky., w. to S. Dak., Iowa and Mo. Intr. 1812. Zone IV.—Var. **Pàlmeri** Sarg. Lvs. 3-lobed, subcordate or truncate, with long-acuminate, nearly entire middle lobe. Ill., Ind. Intr.?—Not much planted; with duller foliage turning yellow in autumn.

16. **A. leucodérme** Small. Tree to 8, rarely to 12 m., with light gray or grayish brown bark: lvs. 3–5-lobed, 5–8 cm. across, truncate or subcordate, with acuminate sinuate-dentate lobes, dark yellow green above, lighter and soft-pubescent beneath: fls. yellow, about 4 mm. long, on slender glabrous pedicels in nearly sessile corymbs: fr. villous, finally glabrous; wings widespreading, with the nutlet 1.5–2 cm. long. Fl.IV; fr.IX. (*A. saccharum* var. *l.* Sarg.) S.S.13:t.624. N. C. to Ga. and La. Cult. 1900. Zone V.—Sometimes planted as a street tree in the S.; the lvs. turn scarlet in autumn.

Group IV. Spicata Pax. Fls. andro-polygamous, in panicles sometimes broad and nearly corymbiform, hypogynous; stamens inside of the thick disk: fr. with convex, strongly veined nutlets: winter-buds with imbricate scales or with only 2 outer scales: lvs. 3–7-lobed, rarely undivided and serrate, the lobes lobulate to serrate.

17. **A. macrophýllum** Pursh. Oregon M. Tree to 30 m.; brts. stout, glabrous: lvs. deeply 3–5-lobed or -cleft, 20–30 cm. across, cordate, the middle lobe mostly 3-lobed, the others lobulate, dark green and lustrous above, pale green and pubescent beneath when young, subcoriaceous; petiole 25–30 cm. long: fls. yellow, fragrant, in narrow pendulous glabrous panicles 10–12 cm. long: nutlets of the fr. with yellow stiff hairs; wings spreading at a right angle or nearly upright, about 3 cm. long. Fl.V; fr.IX. N.S.2:t.67(c). S.S.2:t.86,87. B.T.1:147. F.E.14:t.44(h). Gn.M.2:107(h). Alaska to Cal. Intr. 1812. Zone VI.—Remarkable for its large lvs. turning bright orange in autumn.

18. **A. pseudoplátanus** L. Sycamore M. Tree to 30 m.; brts. glabrous: lvs. 5-lobed, 8–16 cm. across, cordate, lobes ovate, coarsely crenate-serrate dark green and glabrous above, glaucescent beneath and usually glabrous or pubescent on the veins: fls. yellowish green, in pendulous narrow panicles with the stalk 6–12 cm. long: fr. glabrous; wings spreading at an acute or right angle, with the nutlet 3–5 cm. long. Fl.V; fr.VIII–IX. R.I.5:t.164(c). H.W.3:39,40(h),t.44(c). E.H.3:t.179–183(h). F.E.15:t.47(h). Eu., W. Asia. Cult. since centuries. Zone V.—Var. **variegàtum** West. Lvs. variegated with white, reddish when young. S.O.1:t.2(c). (Var. *albo-variegatum* Hayne.) Cult. 1730.—Var. **flavo-variegatum** Hayne. Lvs. marked with yellow. Cult. 1822.—Var. **corstorphinénse** Schwer. Lvs. bright yellow when young. G.F. 6:205(h). (Var. *flava variegata* Loud.) Cult. 1600.—Var. **Worleèi** Schwer. Lvs. deep yellow, orange-yellow when young, petiole reddish.—Var. **Leopóldii** Lem. Lvs. bright rosy pink while young and variegated with yellowish pink. I.H.11:t.411(c). R.B.32:197,t.f.4(c).—Var. **purpúreum** Loud. Lvs. purple beneath. (F. *purpurascens* Pax, f. *atropurpureum* Spaeth.) Orig. 1828.—Var. **erythrocárpum** Carr. Lvs. smaller and more lustrous; fr. bright red. R.H.1864:171,t(c). M.D.1905:1,t.(c). Gn.76:540.—Var. **euchlòrum** Schwer. Lvs. large, dark green above: fr. large, samara to 6 cm. long.—Var. **tomentòsum** Tausch. Lvs. pubescent beneath, more coarsely toothed, subcoriaceous; wings of fr. to 2 cm. broad, rounded at apex. (Var. *villosum* Parl.) S. Eu.—Large tree of vigorous growth, with spreading head; thrives well in exposed situations and near the sea shore.

A. p. × *monspessulanum* = **A. coriàceum** Tausch. Lvs. 3-lobed, 5–8 cm. across, subcordate, lobes crenate-denticulate, lustrous above, glabrous beneath: fls. in

loose corymbs; samaras 2.5 cm. long; wings diverging at an acute angle. S.O.1: t.15(c). D.L.2:433. S.H.2:f.130e. (*A. creticum* Schmidt, not L., *A. polymorphum* Spach, *A. parvifolium* Tausch.) Orig. unknown, cult. 1790.—The following are probably of the same parentage: **A. hýbridum** Spach. Lvs. 3-lobed, sometimes with 2 small basal lobes, 5–10 cm. across, the lobes pointing forward, acute, denticulate, dull green above, pubescent on the veins beneath: fls. in panicles 8–12 cm. long: samaras 2–2.5 cm. long, wings nearly parallel. D.L.2:422. S.H.2:f.130d. (*A. monspessulanum* × *opalus* Pax.)—**A. Duréttii** Pax. Lvs. 3-lobed, often with 2 small basal lobes, 5–10 cm. across, lobes triangular, irregularly toothed, pubescent on the veins beneath: fls. in corymbs. S.H.2:f.130a(l). (*A. pseudopl.* × *obtusatum* Pax.)—**A. rotundílobum** Schwer. Lvs. 3-lobed, with rounded obscurely denticulate or nearly entire lobes, glabrous beneath. M.D.1894:47(l). S.H.2:f.161c(l). (*A. pseudopl.* × *obtusatum* Pax, *A. barbatum* Booth, not Michx.) Cult. 1889.—Doubtful hybrids of *A. pseudoplatanus* are: **A. seríceum** Schwer. Lvs. 5-lobed, lobes doubly serrate, pubescent beneath. M.D.1894:47(l). S.H.2:f.130b.—**A. ramôsum** Schwer. Lvs. 3-lobed with doubly serrate lobes, glabrous. M.D.1894:47(l). (? *A. pseudopl.* × *campestre* Schwer.)

19. **A. Heldreìchii** Orph. Tree of medium height; brts. dark red-brown: lvs. 5-lobed, 8–12 cm. across, lobes oblong, coarsely toothed or lobulate, the middle one divided nearly to the base, the lateral ones halfway, dark green and lustrous above, glaucous beneath and slightly villous along the veins or nearly glabrous at maturity: fls. yellow, in upright ovoid long-stalked panicles: fr. glabrous, wings spreading at an obtuse angle, with the nutlet 3.5–5 cm. long. Fl.v; fr.ix. Gt.34:t.1185. G.C.II.16:141(l). D.H.2:430. S.E. Eu. Intr. 1879. Zone V.—Var. **purpuràtum** Schwer. Lvs. red beneath.—Handsome Maple, remarkable for its deeply divided lvs.

20. **A. Trautvétteri** Medwed. Tree to 15 m.; brts. glabrous, dark red-brown at maturity: lvs. deeply 5-lobed, 10–16 cm. across, cordate, lobes ovate-oblong, acuminate, lobulate and irregularly dentate, lustrous dark green above, glaucous beneath, villous along the veins when young beneath, glabrous and finely reticulate at maturity: fls. in upright long-stalked pyramidal panicles: fr. pubescent when young, wings nearly parallel, with the nutlet 4–5 cm. long. Fl.v; fr.ix. B.M.6697(c, as *A. insigne*). Gt.40:264–266. E.H.3:t.206,f.19. G.C.II.16:75. Cauc. Intr. 1866. Zone V.

21. **A. insígne** Boiss. & Buhse. Large tree; winter-buds pointed, with 8–10 outer scales: lvs. 5-lobed, 12–18 cm. across, subcordate, lobes ovate, coarsely and irregularly crenate-serrate, bright green above, glaucescent beneath and slightly pubescent when young especially along the veins, finally glabrous or nearly so: fls. in erect broad nearly rounded panicles 8–10 cm. wide: fr. pubescent when young, finally glabrous; wings spreading at a right angle or ascending, with the nutlet 3–4.5 long. Fl.v; fr.ix–x. Gt.30:120. Gn.19:355. E.H.3:t.206,f.18. R.H.1914:225, 226,f.67,69(h). (*A. i.* var. *glabrescens* Boiss. & Buhse.) Cauc., N. Persia. Cult. 1873. Zone VI or VII. —Var. **Wôlfii** Schwer. Lvs. red beneath.—Var. **velutînum** Boiss. & Buhse. Lvs. beneath and fr. pubescent. G.C.III.10:189. Cult. 1873.—Var. **Van Volxèmii** Pax. Brts. pubescent at nodes: lvs. to 30 cm. broad, cordate at base, with coarsely serrate lobes, glaucous beneath and pubescent in the axils and along the veins: wings of fr. spreading nearly horizontally. G.C. III.10:9,11. D.L.2:432. R.H.1914:225, 227,f.68,70(h). (Var. *perckense* Schwer., *A. Van Volxemii* Mast.) Cult. 1873.—Handsome Maple, remarkable for its large lvs., particularly the var. *Van Volxemii*.

A related species is **A. caèsium** Wall. Lvs. 5-lobed, 15–20 cm. across, cordate, lobes ovate, acuminate, coarsely serrate, glaucous beneath and glabrescent: fls. in large pyramidal panicles: wings of fr. spreading at a right angle, with the nutlet 4.5–5 cm. long. Brandis, For. Fl.t.21. S.H.2:f.131c,133m. Himal. Cult. 1900. Zone VII or VIII.

22. **A. Buergerianum** Miq. Small tree; brts. glabrous; lvs. 3-lobed, 3.5–8 cm. across, 3-nerved at base and rounded or broad-cuneate, lobes triangular, acute and pointing forward, entire or slightly and irregularly serrate, dark green above, pale green or glaucescent beneath and pubescent while young, soon glabrous; petiole about as long as blade: fls. small in a broad-pyramidal pubescent panicle: fr. glabrous; wings parallel and connivent, with the nutlet 2–2.5 cm. long. Fl.v; fr.ix. S.Z.2:t.143. J.C.32,1:t.17. S.H.2:f.126b-c,127a-d. (*A. trifidum* Hook. & Arn., not Thunb.) E. China, Japan. Cult. 1890. Zone VI.—Var. **trinérve** Rehd. Lvs. deeply 3-lobed with oblong-ovate irregularly and doubly serrate lobes, the lateral ones spreading and shorter. D.L. 2:429(l). (*A. t.* Dipp.) Cult. 1890. Probably juvenile form.

23. **A. gínnala** Maxim. Shrub or small tree to 7 m.; brts. glabrous, slender: lvs. 3-lobed, 4–8 cm. long, 3–6 cm. wide, rarely undivided and ovate-oblong, subcordate or truncate, the middle lobe usually ovate-oblong, much longer than the lateral ones, doubly serrate, dark green and lustrous above, light green beneath, glabrous; petiole 1.5–4 cm. long: fls. yellowish white, fragrant, in long-peduncled panicle: fr. glabrous, wings nearly parallel, with the nutlet about 2.5 cm. long. Fl.v; fr.ix. S.I.2:t.44(c). G.W.12:18,t(c). N.K. 1:t.2. Gt.1877:308. B.C.1:201. F.E.17:t.72(h). (*A. tataricum* var. *g.* Maxim., *A. tataricum* var. *aidzuense* Franch.) C. and N. China, Manch., Japan. Intr. about 1860. Zone IV.—Var. **Semenòvii** Pax. Shrubby: lvs. smaller, deeply 3- or nearly 5-lobed, with narrower lobes: fr. with more divergent wings. Bull. Soc. Nat. Mosc.39:t.12. (*A. S.* Reg. & Herd.) Turkest. Cult. 1880. Zone IV.—Graceful Maple with the fr. usually red and conspicuous during the summer; the lvs. turning bright red in autumn.

24. **A. tatáricum** L. Tatarian M. Shrub or small tree to 10 m.; brts. glabrous: lvs. broad-ovate to ovate-oblong, 5–10 cm. long, rounded to cordate at base, acuminate, irregularly doubly serrate, bright green and glabrous above, pubescent on the veins beneath when young, finally nearly glabrous; petiole 1.5–5 cm. long: fls. greenish white, in upright glabrous long-peduncled panicles: wings of the glabrous fr. nearly parallel, with the nutlet 2–3 cm. long. Fl.v; fr.ix. S.O.1:t.9(c). R.I.5:t.162(c). S.W.3:43. G.O.t.47(c). S. E. Eu., W. Asia. Intr. 1759. Zone IV.—Handsome and distinct Maple with attractive red fr. in late summer and bright green lvs. turning yellow in autumn.

A. t. × *monspessulanum* = **A. pusíllum** Schwer. Shrub: lvs. oblong-ovate, 2–4 cm. long, with 2 lobes at base, obtusely doubly serrulate, glabrous. M.D.1894: 47(l). (*A. Boscii* K. Koch, not Spach.) Cult. 1870.—*A. t.* × *pennsylvanicum* = **A. Bóscii** Spach. Lvs. broad-obovate, 8–10 cm. long, 3-lobed near apex, with broad-triangular serrulate lobes, glabrescent. D.L.2:420. S.H.2:f.130c(l). Orig. before 1834.

25. **A. spicàtum** Lam. Mountain M. Shrub or small tree, rarely to 10 m.; young brts. grayish pubescent: lvs. 3-lobed or sometimes slightly 5-lobed, 6–12 cm. long, cordate, lobes ovate, acuminate, coarsely and irregularly serrate, yellowish green above, pubescent beneath: fls. small, greenish yellow, in upright pubescent narrow spikes 8–14 cm. long; ovary pubescent: fr. nearly glabrous at maturity, wings divergent at an acute or nearly right angle, with the nutlet about 1.5 cm. long. Fl.vi; fr.ix. M.S.1:t.47(c). Em. 567,t. S.S.2:t.82,83. H.H.328, 329(b). Am. For. 28:15,18. Lab. to Sask., s. to n. Ga. and Iowa. Intr. 1750. Zone II or I.—Shrubby Maple with light green lvs. turning orange and scarlet in autumn; the fr. sometimes bright red and conspicuous in summer.

26. **A. caudàtum** Wall. Large tree: lvs. 5–7-lobed, 8–14 cm. across,

cordate, lobes ovate, long-acuminate, incisely serrate, brownish pubescent on the veins beneath: fls. small, in upright cylindric spikes, 12–15 cm. long: fr. small, the wings spreading at a right angle. Wallich. Pl. As. Rar. 2:t.132(c). D.L.2:424. (*A. pictum himalayense* Hort.) Himal. Cult. 1910. Zone VI?—Var. **ukurunduénse** Rehd. Small tree; brts. and petioles pubescent while young: lvs. glabrous above, pubescent beneath, sometimes only along the veins, lobes coarsely serrate; spikes pubescent: fr. with nearly upright wings. S.I.2:t.43(c). S.T.1:t.82. G.C.II.15:172. N.K.1:t.1. (*A. u.* Fisch. & Mey., *A. spicatum* var. *u.* Maxim., *A. vitifolium* Hort.) Japan, Manch. Cult. 1880. Zone V.—Var. **multiserràtum** Rehd. Tree to 10 m.; similar to the preceding var., but lvs. glabrous or nearly so beneath. S.H.2:f.131d(l). (*A. m.* Maxim., *A. erosum* Pax, *A. ukurunduense* var. *m.* Schneid.) C. China. Intr. 1907. Zone V or VI?

A closely related species is **A. eriánthum** Schwer. Small tree: lvs. 5-lobed, lobes broad, unequally and simply serrate, nearly glabrous beneath except conspicuous axillary tufts of white hairs: fls. with densely villous disk. S.T.1:t.80. China. Intr. 1910? Zone VI?—Another related species is **A. parviflòrum** Franch. & Sav. Tree: lvs. 3–5-lobed, 10–15 cm. across, lobes broad-ovate, acute, doubly serrate, pubescent beneath when young, bright green: fls. in narrow puberulous panicles 10–20 cm. long; wings of fr. spreading at an obtuse angle or sometimes ascending. S.I.2:t.42(c). J.C.32,1:t.1. S.L.86(h, as *A. pictum* var. *p.*) M.D.1912:359. (*A. crassipes* Hesse, not Pax, *A. brevilobum* Hesse.) Japan. Cult. 1900. Zone VI (V).

27. **A. sinénse** Pax. Tree to 10 m.; brts. glabrous: lvs. 5-lobed, 8–14 cm. across, cordate and sometimes truncate, lobes ovate, acuminate, sparingly appressed-serrate, dark lustrous green above, glaucescent beneath and glabrous, chartaceous; petiole 3–5 cm. long, usually reddish: fls. greenish white, in pyramidal panicles 5–10 cm. long: wings of fr. spreading at an obtuse angle, with the nutlet about 3 cm. long. Fl.v; fr.ix. S.T.1:t.78. J.H.29:f. 88(l),f.99 and f.103(h), probably a juvenile form. C. China. Intr. 1901. Zone VI?—Var. **cóncolor** Pax. Lvs. green beneath; fr. with horizontally spreading wings.—Tree with handsome dark green lvs. reddish when unfolding.

A related species is **A. Wilsòni** Rehd. Lvs. 3-lobed, sometimes with small basal lobes, 7–10 cm. across, lobes oblong-ovate to oblong, entire or sparingly serrate, light green beneath and glabrous: wings of fr. spreading at a right angle. S.T.1:t.79. S.H.2:f.126e,133a-d. C. China. Intr. 1907. Zone VI?

28. **A. Oliveriànum** Pax. Tree to 10 m.; brts. glabrous: lvs. 5-lobed, 6–10 cm. across, truncate or subcordate, lobes ovate, long-acuminate, finely serrate, lustrous and finely reticulate beneath: fls. whitish, small, in nearly corymbose long-stalked glabrous panicles: wings of fr. spreading nearly horizontally, with the nutlet about 2.5 cm. long. Fl.v; fr.ix. S.T.1:t.77. S.H. 2:f.131e,133r-u. C. China. Intr. 1901. Zone VI?—Handsome Maple resembling somewhat *A. palmatum.*

A related species is **A. flabellàtum** Rehd. Lvs. 7-lobed, 8–12 cm. across, deeply cordate, lobes sharply serrate, light green beneath and villous along the veins. S.T.1:t.81. S.H.2:f.131f,133v-y. (*A. robustum* Schneid., not Pax.) C. China. Intr. ?

Group V. Palmata Pax. Fls. andro-polygamous, in few-fld. corymbs, hypogynous, usually red; stamens inside of the thick disk: fr. with small convex strongly veined nutlets: lvs. 5–11-lobed, with serrate lobes: winter-buds with 2 or 4 outer scales.

29. **A. circinàtum** Pursh. Vine M. Shrub or small tree to 12 m.; brts. glabrous, slender: lvs. 7–9-lobed, 6–12 cm. across, cordate, lobes acute, irregularly and doubly serrate, bright green, puberulous beneath when young, becoming glabrous; petioles 2.5–3.5 cm. long, stout: fls. about 1.2 cm. across in glabrous, 6–20-fld. corymbs; sepals purple; petals smaller, white: wings of

fr. spreading almost horizontally, with the nutlet 3.5 cm. long. Fl.IV–V; fr.IX. N.S.2:t.68(c). S.S.2:t.87. B.S.1:138. D.L.2:463. B. C. to Calif. Intr. 1826. Zone V.—Usually a wide-spreading shrub with handsome bright green lvs. turning red and orange in autumn, attractive in spring with its purple and white fls. and later with the young red frs.

30. **A. palmàtum** Thunb. JAPANESE M. Shrub or small tree to 8 m.; brts. glabrous, slender: lvs. deeply 5–9-lobed or parted, 5–10 cm. across, subcordate, lobes lance-ovate or lance-oblong, acuminate, doubly serrate, glabrous and bright green beneath; petioles glabrous, slender, 1.5–4.5 cm. long: fls. purple, 6–8 mm. across, in small glabrous corymbs; anthers smooth: wings of fr. spreading at an obtuse angle and incurved above, with the glabrous nutlet about 1 cm. long. Fl.VI; fr.IX. S.Z.2:t.145, 146(c). S.I.1:t.68(c). J.H.29:f.82(h). Gn.86:501(h). (*A. polymorphum* S. & Z.). Korea, Japan. Intr. 1820. Zone V.—Graceful shrub or small tree of which numerous forms varying in shape and coloration of the lvs. are cult.; the lvs. of the green forms turn bright red in autumn. The numerous forms may be divided into the following groups:

Var. **Thunbérgii** Pax. Lvs. deeply 5–9-lobed or cleft; lobes oblong-lanceolate, coarsely and doubly serrate or incisely serrate. (*A. palmatum* Thunb., type.) Here belong the following forms: Var. **atropurpúreum** Nichols. Lvs. deep purple. F.S.12:t.1273(c). J.H.29:f.83(h). F.E.14:t.42(h);32:767(h). (Var. *nigrum* Hort.)—Var. **sanguíneum** Lem. Lvs. lighter purplish red. I.H.14:t.526(c).—Var. **aùreum** Nichols. Lvs. yellow becoming golden yellow. —Var. **versícolor** Schwer. Lvs. bright green with large white spots. F.S.14:t. 1498(c).—Var. **roseo-marginàtum** Nichols. Lvs. small, deeply cut, with narrow pink margin. F.S.15:t.1566(c). I.H.28:t.430(c).

Var. **septémlobum** K. Koch. Lvs. larger, mostly 7-lobed, with ovate-oblong equally and more finely doubly serrate lobes broadest about the middle. Gt.42:680. J.C.32,1:t.28. J.H.29:f.84(h). Here belong: Var. **rúbrum** Schwer. Lvs. large, deep red when young, turning later nearly green.—Var. **reticulàtum** André. Lvs. greenish yellow with green margin and dark green veins. I.H.17:t.18(c).

Var. **linearilobum** Miq. Lvs. divided nearly to the base, lobes linear, remotely serrate or nearly entire. Gt.42:681. S.Z.2:t.146,f.1(c).—Var. **atrolineàre** Schwer. Lvs. dark red. (Var. *linearilobum atropurpureum* Nichols.)

Var. **multífidum** K. Koch. Lvs. divided to the base into 5–9 pinnatifid lobes. S.Z.1:t.146,f.2–4. F.S.21:t.2156(c). G.C.III.31:46, suppl. J.H.29:f. 85(h). (Var. *dissectum* K. Koch, var. *decompositum* Miq., *A. dissectum* Thunb., *A. polymorphum* var. *palmatifidum* Van Houtte.)—Var. **ornàtum** Nichols. A form of the preceding var. with deep red lvs. R.H.1867:391(c). R.B.32:197,t.f.1(c). I.H.17:t.46(c). F.E.15:t.49(h).

Var. **sessilifòlium** Maxim. Lvs. deeply cut, on very short petioles. G.C. II.16:137.

Closely related species are: **A. Shirasawànum** Koidz. Lvs. usually 11-lobed, cordate: fls. yellowish white; ovary pubescent: wings spreading at a very obtuse angle. J.C.32,1:t.22. Japan. Intr. ?—**A. robústum** Pax. Small tree: lvs. 7–9-lobed, 7–10 cm. across, cordate, with ovate acuminate sharply serrate lobes: wings of fr. nearly horizontally spreading. C. China. Intr. 1907. Zone VI?

31. **A. Sieboldiànum** Miq. Shrub or small tree: brts., petioles and peduncles pubescent when young: lvs. 7–9-lobed, 5–8 cm. across, cordate to nearly truncate, with ovate-oblong acuminate sharply serrate lobes, pubescent on the veins beneath: fls. small, yellowish, on long nodding pubescent peduncles; ovary pubescent; pedicels and sepals outside pubescent: fr. gla-

brous or slightly pubescent, wings spreading at an obtuse angle, with the nutlet 1.5–2 cm. long. Fl.v; fr.IX. S.I.2:t.45(c). G.C.II.16:591. D.L.2:459. J.C.32,1:t.21. (*A. japonicum* var. *S.* Franch. & Sav.) Japan. Cult. 1880. Zone V.—Var. **microphýllum** Maxim. Lvs. smaller, 5–6 cm. broad.

A closely related species is **A. pseudo-sieboldiànum** Komar. Lvs. 9–11-lobed, cordate, with lance-oblong doubly serrate lobes: infl. pubescent at first, soon glabrous; fls. purple; pedicels glabrous; sepals ciliate. N.K.1:t.4. J.C.26,1:t.10. (*A. circumlobatum* var. *p.* Pax, *A. Sieboldianum* var. *mandshuricum* Maxim.) Manch. to Korea. Cult. 1903. Zone V.

32. **A. japónicum** Thunb. Shrub or small tree; young brts. glabrous: lvs. 7–11-lobed, 8–14 cm. across, cordate, with ovate acuminate doubly serrate lobes, light green, with silky hairs when young, soon glabrous or nearly glabrous except on the veins beneath; petiole 2–4 cm. long, pubescent at least when young: fls. purple, 1–1.5 cm. across, in long-stalked nodding corymbs; sepals purple; petals purplish, shorter: fr. pubescent when young, finally glabrous, wings spreading at an obtuse angle or nearly horizontal, with the nutlet 2–2.5 cm. long. Fl.v; fr.IX. S.Z.2:t.44(c). S.I.1:t.66(c). J.C.32,1:t.24. B.C.1:200. J.H.29:f.78(h). Japan. Intr. 1864. Zone (V), VI. —Var. **aùreum** Schwerin. Lvs. yellow.—Var. **microphýllum** Veitch. Lvs. smaller. J.H.29:f.79(h).—Var. **Parsónsii** Veitch. Lvs. deeply divided sometimes nearly to the base into 9–11 pinnatisect lobes. R.B.32:197,t,f.2(c). J.C.32,1:t.25,f.7. J.H.29:f.77(h). (Var. *Heihachii* Mak., var. *filicifolium* Hort., var. *lacinatum* Hort.)—A very handsome Maple with bright green lvs. turning crimson in autumn.

A closely related species is **A. nudicárpum** Nakai. Brts. glaucous: lvs. long-petioled: fr. quite glabrous, with curved wings. N.K.1:t.8. (*A. japonicum* var. *n.* Nakai.) Japan. Intr. 1918.

Group VI. Glabra Pax. Fls. andro-polygamous or andro-dioecious, perigynous; stamens shorter than petals: fr. with convex nutlets: lvs. 3–5-lobed or 3-foliolate: winter-buds with 2 or 4 outer scales.

33. **A. glábrum** Torr. Shrub or small tree to 8 m., quite glabrous: lvs. 3–5-lobed or 3-parted, 7–12 cm. across, subcordate to broad-cuneate, with doubly serrate acute lobes usually rhombic in outline, dark lustrous green above, paler or glaucescent beneath, thin; petioles slender, red or reddish: fls. greenish yellow, 6 mm. across, in 6–15-fld. racemose corymbs: wings of fr. nearly upright or slightly spreading, with the nutlet about 2 cm. long, often rose-colored during the summer. Fl.v; fr.IX. S.S.2:t.89. Mont. and S. Dak. to Calif. and N. Mex. Intr. 1882. Zone V.—Var. **rhodocárpum** Schwer. Fr. bright red until fully ripe. Intr. about 1910.—Var. **triséctum** Sarg. Lvs. smaller, usually 3-foliolate. S.H.2:f.150c(1). (Var. *tripartitum* Pax, not *A. t.* Nutt.) Intr. 1882.—Var. **Douglàsii** Dipp. Lvs. 3-lobed, subcordate, lobes short-acuminate, often lobulate, the terminal one broad-ovate from a broad base, with acuminate teeth: fr. to 2.5 cm. long, with broader wings. London Jour. Bot. 6:t.6. S.M.683. (*A. D.* Hook.) Alaska to Ore. and Wyo. Intr. 1902. Zone V.—A graceful and distinct Maple with handsome lvs. turning bright yellow in autumn.

Group VII. Integrifolia Pax. Fls. andro-polygamous, hypogynous, in panicles: fr. with convex nutlets: lvs. not lobed, or very rarely and chiefly on young plants with 2 lobes near the base: winter-buds with many or only 2 or 4 outer scales.

34. **A. oblóngum** Wall. Deciduous or half-evergreen tree to 8 or sometimes to 15 m.; brts. glabrous; buds with many scales: lvs. oblong or oblong-ovate, 5–12 cm. long, rounded or broad-cuneate at base and 3-nerved, obtusely acuminate, entire or on young trees 3-lobed and toothed, reticulate and

glaucous beneath, glabrous, subcoriaceous; petiole 1.5–4 cm. long: fls. small, greenish, in short pubescent panicles: fr. glabrous; wings spreading at a right angle or nearly horizontal, with the nutlet about 2.5 cm. long. Fl.IV–V; fr. IX. Jacquemont, Voy. Inde,4:t.34. J.C.32,1:t.29. C.C.231. J.H.29:f.95 (juvenile form). Himal., C. and W. China. Intr. 1901 from China. Zone VII.—Var. **cóncolor** Pax. Lvs. green beneath. China.—A Maple with characteristic lvs.

Related species but lvs. not 3-nerved at base are: **A. Fargèsi** Franch. Tree to 10 m.: lvs. lance-oblong, 5–8 cm. long, cuneate, light green beneath, not reticulate, glabrous; young lvs. and infl. red: fr. red, wings spreading at a right or obtuse angle. J.H.29:f.91(1). (*A. laevigatum* var. *F.* Veitch.) China. Intr. 1902. Zone VII?—**A. laevigâtum** Wall. Tree: lvs. oblong, 6–15 cm. long, cuneate, nearly entire, green and reticulate beneath; wings of fr. spreading at an obtuse angle or nearly horizontal, with the oblong nutlet 3–4 cm. long. Wallich, Pl. As. Rar.2:t. 104(c). Himal., China. Intr. 1907. Zone VII or VIII.

35. **A. dístylum** Sieb. & Zucc. Deciduous tree to 15 m.; brts. puberulous when young; winter-buds with 2 outer scales: lvs. ovate, 10–16 cm. long, deeply cordate, acuminate, serrulate, green and lustrous beneath, glabrous: petiole 2–6 cm. long, puberulous when young: fls. yellowish, in panicles 5–6 cm. long on stalks of nearly equal length; styles divided to base: fr. in upright panicles; wings spreading at an acute angle, with the nutlet 2.5–3 cm. long. Fl.VI; fr.IX. S.I.2:t.41(c). J.C.32,1:t.2. G.C.II.15:499. J.H.29:f.76(h). Japan. Intr. 1879 to 1881. Zone VII?

A related species is **A. Schwerînii** Pax. Lvs. ovate, cordate, slightly lobulate and denticulate, 10–16 cm. long, glaucescent beneath. S.H.2:f.141a-b. Orig. unknown. Zone VI?

Group VIII. INDIVISA Pax. Fls. andro-monoecious or andro-dioecious, apetalous, 4-merous, hypogynous, racemose; stamens 5–6, inserted outside the disk; styles 2-parted: fr. with compressed elliptic-oblong nutlet: lvs. undivided, oblong, doubly serrate, penninerved: winter-buds with many imbricate scales. (*Carpinifolia* Koidz.)

36. **A. carpinifòlium** Sieb. & Zucc. HORNBEAM M. Tree to 10 m.; brts. slender, glabrous: lvs. ovate-oblong, 8–12 cm. long, subcordate to truncate, long-acuminate, doubly serrate, pubescent on the veins beneath when young, finally glabrous or nearly so; petiole 1–1.5 cm. long: fls. greenish, about 1 cm. across, on slender pedicels in short glabrous racemes: fr. glabrous, on pedicels 2–3 cm. long, wings spreading at a right or obtuse angle incurved at apex, with the nutlet about 3 cm. long. Fl.V; fr.IX. S.Z.2:142(c). J.C.32,1:t.8. G.C.II.15:564. J.H.29:f.75(h). S.L.83(h). Japan. Intr. 1881. Zone V.—Very distinct and handsome Maple with bright green lvs. turning bright brownish yellow in autumn.

Group IX. MACRANTHA Pax. Fls. monoecious or dioecious, hypogenous, racemose; stamens inserted outside of the disk; style deeply 2-lobed: fr. with flattened not strongly veined nutlets: lvs. undivided or 3–5-lobed, serrate or doubly serrate; winter-buds with 2 outer valvate scales, stalked; bark of brts. remaining smooth for several years.

37. **A. Davidi** Franch. Tree to 15 m.; brts. glabrous, striate: lvs. ovate to ovate-oblong, 8–16 cm. long, acuminate, subcordate or rounded at base and not prominently 3- or 5-nerved, unequally crenate-serrulate, green beneath and rufous-villous on the veins while young, finally glabrous or nearly so; petiole 1.5–5 cm. long: fls. yellowish in slender glabrous pendulous racemes 6–9 cm. long, the staminate ones shorter: fr. on pedicels 2–8 mm. long; wings spreading nearly horizontally, with the nutlet 2.5–3 cm. long. Fl.V; fr.IX. S.T.1:t.83. G.C.III.41:46;72:119(b). J.H.29:f.86(h),90. C. China. Intr. 1879 and 1902. Zone V.—A distinct Maple with handsome lvs. turning yellow

and purple in autumn; the lustrous brs. striped white are conspicuous in winter as are those of the following species.

Related species are: **A. Hoòkeri** Miq. Lvs. oblong-ovate, 10–14 cm. long, cordate and 5-nerved at base, abruptly caudate-acuminate; sharply serrate, glabrous; petiole 4–7 cm. long: fl. on slender pedicels 4–7 mm. long. D.L.2:408 (juvenile state). E. Himal. Cult. 1892. Zone VII?—**A. sikkimènse** Miq. Lvs. ovate to ovate-oblong, 10–14 cm. long, abruptly acuminate, subcordate and 3-nerved at base, entire or serrulate, glabrous; petiole 2–5 cm. long: racemes in fr. to 15 cm. long; pedicels 1–2 mm. long. E. Himal. and S. W. China. Cult. 1880. Zone VII or VIII.

38. **A. crataegifòlium** S. & Z. Small tree to 10 m.; brts. purplish, glabrous: lvs. oblong-ovate, 5–8 cm. long, acuminate, subcordate to truncate, usually with 2 or 4 short lobes near base, unequally serrate, bluish green and glabrous; petiole 1.5–2 cm. long: fls. yellowish white, in erect 5–8-fld. glabrous racemes 3–5 cm. long: fr. glabrous, on pedicels about 6 mm. long; wings spreading nearly horizontally, with the nutlet 2–2.5 cm. long. Fl.v; fr.IX. S.Z.2:147(c). S.I.1:t.67(c). J.C.32,1:t.3. D.L.2:417. Japan. Intr. 1879. Zone (V).—Var. **Veìtchii** Nichols. Lvs. variegated with white or pink.—Graceful shrub.

Related species are: **A. Veìtchii** Schwer. Brts. greenish: lvs. ovate-oblong, 7–10 cm. long, slightly lobulate, greenish beneath; petiole 2–5 cm. long. Orig. unknown. S.H.2:f.144g,145a-b. (?*A. crataegifolium* × *pennsylvanicum* Pax.) Cult. 1890.—**A. laxiflòrum** Pax. Tree to 15 m.: lvs. oblong-ovate, 6–10 cm. long, long-acuminate, cordate, with 2 or 4 short lobes near base, sharply serrate, green and glabrous beneath: racemes slender, pendulous: wings of fr. usually spreading at a right angle. E.P.IV.163:35. W. China. Intr. 1908. Zone VI?

39. **A. pennsylvànicum** L. Moosewood. Small tree, rarely to 12 m.; brts. green, smooth, becoming conspicuously striped with white lines: lvs. roundish-obovate, 3-lobed at apex, 12–18 cm. long, subcordate, the lobes pointing forward, acuminate, serrulate, ferrugineous-pubescent beneath when young; petiole 2–7 cm. long, rufous-pubescent when young: fls. yellow, about 6 mm. across, in pendulous glabrous racemes 10–15 cm. long: fr. on pedicels 1–1.5 cm. long; wings spreading at a wide angle, with the nutlet about 2 cm. long. Fl.v–VI; fr.IX. M.S.2:t.45(c). Em.566,t. S.S.2:t.84,85. H.H.330, 331(b). Am. For. 20:505;28:15,17. (*A. striatum* Lam.—Striped M.) Que. to Wis., s. to n. Ga. Intr. 1755. Zone IV.—Var. **erythrócladum** Spaeth. Brs. bright red in winter. Cult. 1904.—Small tree with large bright green lvs. turning clear yellow in autumn; the stout striped brs. conspicuous in winter.

A. p. × *tataricum* = *A. Boscii;* see under No. 24.

40. **A. rufinérve** Sieb. & Zucc. Tree to 12 m.; brts. glaucous when young: lvs. 3-lobed, 6–12 cm. long, rounded at base, the lateral lobes somewhat spreading, sometimes with 2 very small basal lobes, unequally doubly serrate, dark green above, rufous-pubescent on the veins beneath when young; petiole 2–6 cm. long, rufous-pubescent when young: fls. in upright ferrugineous-pubescent racemes: fr. pubescent at first, finally glabrous, on pedicels about 5 mm. long; wings spreading at an obtuse angle, with the nutlet about 2 cm. long. Fl.v; fr.IX. S.Z.2:t.148(c). S.I.1:t.67(c). J.C.32,1:t.9. D.L.2: 415. Gs.2:36(b). Japan. Intr. 1879. Zone V.—Var. **albo-limbàtum** Hook. Lvs. with a broad margin of white spots. B.M.5793(c). R.B.4:49,t.(c). Cult. 1869.—Handsome tree with large dark green foliage turning crimson in autumn.

41. **A. capíllipes** Maxim. Tree to 12 m.: brts. smooth, striped: lvs. 3-lobed, 6–12 cm. long, subcordate or rounded at base, lobes acuminate, the lateral ones much shorter, spreading outward, doubly serrate, dark green

above, bright green and glabrous beneath, usually with reddish veins; petiole 3–5 cm. long, slender, usually red: fls. greenish white, about 8 mm. across, on slender pedicels 8–15 mm. long, in glabrous drooping racemes 7–10 cm. long: fr. on slender pedicels; wings spreading at a wide angle or nearly horizontal, with the nutlet 1.5–2 cm. long. Fl.v; fr.ix. S.T.1:t.16. J.C.32,1:t.10. S.H.2:f.163f-g,164a-b. Gn.85:81(b). Japan. Intr. 1892. Zone V.—Graceful small tree with bright green lvs. red when unfolding, turning deep crimson in autumn.

42. **A. tegméntosum** Maxim. Tree: brs. striped: lvs. 3-lobed, sometimes with 2 small basal lobes, 7–16 cm. long and nearly as wide, cordate or subcordate, lobes acuminate, the lateral ones much smaller and somewhat spreading, doubly serrulate, glabrous beneath, light green when unfolding; petiole 3–8 cm. long: fls. in slender pendulous racemes about 8 cm. long: fr. on short pedicels 3–8 mm. long; wings spreading at a wide angle or nearly horizontal, with the nutlets about 3 cm. long. Fl.v; fr.ix. N.K.1:t.13. G.C.II.15:75(l). S.H.2:f.163d-e,164f. Manch., Korea. Intr. 1892. Zone V or IV.

43. **A. Tschonóskii** Maxim. Small tree to 6 m.: lvs. orbicular-ovate, 5-, rarely 7-lobed, 5–10 cm. across, cordate, the lobes ovate, sharply and doubly serrate with acuminate teeth and lobulate, rufous-pubescent along the veins beneath when young; petiole 2–4 cm. long: raceme slender, 6–10-fld., glabrous: fr. on slender pedicels, 1–1.5 cm. long, wings spreading at a right or obtuse angle, incurved, with the nutlet 2.5–3 cm. long. Fl.v; fr.ix. S.I.2:t. 43(c). S.T.1:t.17. N.K.1:t.14. Japan. Intr. 1892. Zone V.—Graceful shrubby tree; the lvs. turning bright yellow in autumn.

A closely related species is **A. Maximowíczii** Pax. Lvs. 3–5-lobed, 5–8 cm. long, lobes acuminate, the middle lobe elongated and caudate-acuminate, doubly serrate, glaucescent and glabrous beneath: fr. on slender pedicels 5–10 mm. long; wings spreading at a wide angle. S.T.1:t.84. M.I.1:t.10. (*A. urophyllum* Maxim.) C. China. Intr. ?

44. **A. micránthum** Sieb. & Zucc. Shrub or small tree: lvs. 5- or sometimes 7-lobed, 5–8 cm. wide, cordate, the lobes ovate, long-acuminate, incisely and doubly serrate, glabrous beneath; petiole 2–4 cm. long: fls. small, greenish white, in slender racemes 3–7 cm. long; fr. glabrous, on pedicels 2–6 mm. long; wings spreading at a wide angle or nearly horizontal, with the nutlet 1.5–2 cm. long. Fl.v; fr.ix. S.Z.2:t.141(c). S.I.2:t.44(c). J.C.32,1:t.12. Japan. Intr. 1879. Zone V.—Graceful shrubby tree.

Group X. Arguta Rehd. Fls. dioecious, 4-merous, the pistillate ones in racemes terminal on 2-leafed brts., the staminate from leafless lateral buds; stamens 4; disk 4-lobed, intrastaminal: fr. with convex strongly veined nutlets: lvs. serrate or doubly serrate, 3–5-lobed or undivided; winter-buds with 2 outer scales.

45. **A. argùtum** Maxim. Small tree to 8 m.; brts. pubescent: lvs. broad-ovate, 5- or rarely 7-lobed, 5–8 cm. across, lobes ovate, long-acuminate and sharply serrate, pale green beneath and grayish pubescent chiefly on the veins; petiole 2–6 cm. long, pubescent when young: fls. greenish yellow, the pistillate ones in slender many-fld. racemes 4–5 cm. long: fr. on pedicels 1–2 cm. long; wings horizontal, with the nutlets 1.5–2 cm. long. Fl.iv–v; fr.ix. S.I.1t.69(c). S.T.1:t.66. J.C.32,1:t.14. D.L.2:413(l). Japan. Intr. about 1879. Zone V.—Graceful small tree.

Related species are: **A. barbinérve** Maxim. Lvs. 5-lobed, coarsely doubly serrate, pubescent beneath when young, at maturity only on the veins; petiole 4–9 cm. long: pistillate racemes usually 7-fld.: fr. on pedicels about 2 cm. long; wings spreading at an obtuse angle, with the nutlet about 3.5 cm. long. S.T.1:t.86. N.K.1:t.15. Manch. Intr. about 1890. Zone V.—**A. acuminàtum** Wall. Lvs. 3-lobed, 6–11 cm. long, with long-acuminate doubly serrate lobes, glabrous and

bright green beneath: wings of fr. spreading at a right angle. G.C.II.15:364(as *A. laevigatum*). (*A. caudatum* Nichols., not Wall.) Himal. Intr. 1845. Zone VII?

46. **A. tetrámerum** Pax. Slender tree to 10 m.; brts. glabrous: lvs. ovate to oblong-ovate, 5–8 cm. long, acuminate, truncate or rounded and usually 3-nerved at base, unequally incisely serrate or sometimes lobulate, light green and slightly pubescent beneath or nearly glabrous; petiole 1.5–5 cm. long: fls. yellow; stamens sometimes 6; pistillate fls. in elongated racemes: fr. glabrous, on stalks 1–2.5 cm. long; wings spreading at an acute angle, with the nutlet 2.5–3.5 cm. long. Fl.IV–V; fr.IX. S.T.1:t.85. S.H.2:f.169c-c¹, 170h-k. C. and W. China. Intr. 1901. Zone V.—Var. **lobulàtum** Rehd. Lvs. distinctly lobulate, nearly glabrous. J.H.29:f.93(h),97. Intr. 1901.—Var. **tiliifòlium** Rehd. Lvs. ovate, cordate and 5-nerved at base, doubly serrate, not lobulate, pubescent beneath. W. China. Intr. 1910.

Group XI. Lithocarpa Pax. Fls. dioecious, 5-merous, perigynous, in corymbs or racemes from lateral leafless buds; stamens 8; styles divided to the base: fr. with convex nutlets strongly keeled and veined; embryo with twice conduplicate and incumbent cotyledons: lvs. 3–5-lobed, coarsely dentate: winter-buds with many imbricate scales.

47. **A. diabólicum** K. Koch. Tree to 10 m.; young brts. pilose, becoming glabrous: lvs. 5-lobed, 10–16 cm. across, with broad-ovate short-acuminate coarsely and remotely dentate lobes, appressed-pilose on both sides when young, at maturity only sparingly so beneath, more densely on the veins: petiole 4–10 cm. long, pubescent toward the apex: fls. yellow, the staminate fascicled, on long and pendulous pilose pedicels; sepals more or less connate; petals wanting; stamens exserted, inserted in the middle of the disk; pistillate fls. in few-fld. racemes; sepals and petals distinct, of equal length: fr. on pedicels 1–2, sometimes to 5 cm. long; wings upright or spreading, with the thick bristly nutlets 3–4 cm. long. Fl.IV–V; fr.IX–X. S.T.1:t.67. J.C.32, 1:t.33. G.C.II.15:532. Japan. Cult. 1880. Zone V.—Var. **purpuráscens** Rehd. Fls. purplish: lvs. reddish when unfolding: fr. purple when young. (*A. p.* Franch. & Sav.) Japan. Cult. 1878.—Round-topped tree with rather large lvs.; the variety with conspicuous red fls. just before the lvs. come out and with the young fr. red.

48. **A. Franchèti** Pax. Tree to 6 m.; brts. glabrous: lvs. 3-lobed or sometimes with 2 small basal lobes, 8–12 cm. long and nearly as wide, subcordate, the lobes pointing forward, triangular-ovate, short-acuminate, irregularly and remotely toothed, bright green, at maturity pubescent beneath or nearly glabrous; petiole 5–10 cm. long, pubescent above: fls. yellowish green, in pubescent racemes; sepals and petals of nearly equal length; disk intrastaminal: fr. on rather stout pedicels, 1–2 cm. long; wings spreading at a right angle or nearly upright, with the thick sparingly appressed-pilose nutlet about 5 cm. long. Fl.IV–V; fr.IX. S.T.1:t.87. C. China. Intr. 1901. Zone VI?—Similar to the preceding species.

Related species are: **A. villòsum** Wall. Lvs. 3–5-lobed, 14–20 cm. across, coarsely serrate, tomentose beneath: fr. in long pendulous racemes, often branched at base; wings nearly upright. Wallich, Pl. As. Rar.2:t.105(c). P.F.2:148,f.211(l). D.L.2:412(l). (*A. sterculiaceum* Wall.) Himal. Intr. before 1850. Zone VII?—**A. pilòsum** Maxim. Lvs. 3-lobed, 4–10 cm. across, with coarsely toothed or nearly entire acuminate lobes, the middle one much longer and its margins below the middle nearly parallel, the lateral spreading, glaucescent beneath and pilose on the veins; petiole slender, red: infl. few-fld., fascicle-like. Bull. Acad. Sci. St. Pétersb. 27:t.27,f.1–5. N. W. China. Intr. 1911. Zone V.

Group XII. Rubra Pax. Fls. andro-dioecious, in fascicles from lateral leafless buds long before the lvs.: staminate fls. hypogynous, with 5–8 exserted stamens;

petals present or wanting; disk lobed or wanting: fr. with convex reticulate nutlet: lvs. 3–5-lobed, serrate or coarsely dentate: winter-buds with imbricate scales.

49. **A. rúbrum** L. Red M. Tree to 40 m.; brts. glabrous: lvs. 3–5-lobed, 6–10 cm. long, subcordate, with triangular-ovate, short-acuminate unequally crenate-serrate lobes, dark green and lustrous above, glaucous beneath and usually pubescent on the veins; petiole 5–10 cm. long, often red: fls. slender-stalked, red, rarely yellowish, with petals: fr. glabrous, on pendulous stalks, 6–10 cm. long; wings spreading at a narrow angle, with the nutlet 1.5–2 cm. long, usually bright red when young. Fl.III–IV; fr.V–VI. M.S.2:t.41(c). Em.551,t(c). S.S.2:94. H.H.334, 335(b). G.C.II.1:173. E.H.3:t.177, 191(h). F.L.6:137,t(h). (Scarlet or Swamp M.) Nfdl. to Fla., w. to Minn., Iowa, Okl. and Tex. Cult. 1650. Zone III.—Var. **columnâre** Rehd. Of upright columnar habit. Gn.M.31:382. G.F.7:65(h, as Sugar M.).—Var. **globòsum** Rehd. Of dwarf compact habit; fls. bright scarlet.—Var. **pallidiflòrum** Pax. Fls. yellowish.—Var. **trídens** Wood. Lvs. smaller, 3-lobed near apex, rounded or sometimes broad-cuneate at base, usually pubescent beneath. S.S.13:t.626. (*A. microphyllum* Pax, *A. semiorbiculatum* Pax.)—Var. **tomentòsum** Wesm. Lvs. 5-lobed, pubescent or nearly tomentose beneath: fls. bright red. (*A. t.* Desf., ?*A. sanguineum* Spach, *A. rubrum* var. *fulgens* hort.)—Var. **Drummóndi** Sarg. Lvs. 5-lobed, 8–14 cm. across, white-tomentose beneath when young, remaining pubescent: fr. bright scarlet; wings with the nutlet 3–3.5 cm. long. N.S.2:t.70(c). S.S.2:t.95. (*A. D.* Hook & Arn.) Ind. to Tenn., Mo. and La. Intr. 1886. Zone VII?—Conspicuous in early spring with its red fls. and later with its red fr.; the lvs. turning bright scarlet and yellow in autumn.

A closely related species is **A. pycnánthum** K. Koch. Lvs. 3-lobed, 5–9 cm. long, rounded to subcordate, lobes triangular, sometimes very short, obtusely acuminate, doubly obtuse-serrate, glaucous and glabrous beneath: fr. with upright wings. J. C.32,1:t.16. (*A. rubrum* Mak., not L.) Japan. Intr. 1915. Zone V.

50. **A. saccháriNum** L. Silver-M. Tree to 40 m.: lvs. deeply 5-lobed to 5-cleft, 8–14 cm. across, with deeply and doubly serrate acuminate lobes, the middle one often 3-lobed, bright green above, silvery white beneath and pubescent when young; petiole 8–12 cm. long: fls. short-stalked, greenish, apetalous: fr. pubescent when young, on pendulous pedicels 3–5 cm. long; wings divergent and falcate, with the elliptic-oblong nutlet 3.5–6 cm. long. Fl.II–III; fr.V–VI. M.S.1:t.40(c). Em.556,t(c). S.S.2:t.93. G.C.II.1:37. F.S. 29:983(h);32:443(h). F.L.5:168,t(h). G.W.18:294(h). Gs.3:3(h). (*A. dasycarpum* Ehrh., *A. eriocarpum* Michx.) Que. to Fla., w. to Minn., Neb., Kans., Okl. Intr. 1725. Zone IV.—Var. **Wieri** Pax. Lvs. deeply cleft with dissected narrow lobes: brs. pendulous. S.H.2:f.148e. H.G.35:71. M.G.18: 628(h).—Var. **tripartìtum** Pax. Lvs. divided nearly to the base into 3 broad lobulate lobes. S.H.2:f.148b(l).—Var. **lutéscens** Pax. Lvs. yellow, bronze-colored when unfolding. Gart.-Zeit. 2:513,t.f.5(c).—Var. **péndulum** Pax. Brs. pendulous.—Wide-spreading tree with slender often pendulous brs.; the handsome and graceful lvs. turning clear yellow in autumn.

Group XIII. Trifoliata Pax. Fls. andro-dioecious, hypogynous, in terminal few-fld. corymbs on leafy brts.; stamens 8; disk thick, extrastaminal: lvs. 3-foliolate; winter-buds with many imbricate scales.

51. **A. nikoénse** Maxim. Nikko M. Tree to 15 m.; brts. with pilose pubescence persistent until the 2d year: lfts. ovate to elliptic-oblong, 5–12 cm. long, the middle one short-stalked, the lateral ones subsessile, acute, obtusely dentate or nearly entire, villous-pubescent beneath; petiole densely pilose, 2–4 cm. long: fls. yellow, in usually 3-fld. short-stalked nodding densely pubescent cymes; stamens exserted: fr. with upright wings curved inward or

spreading at a right angle, with the thick densely pubescent nutlet 3–5 cm. long. Fl.v; fr.ix. S.I.1:t.68(c). G.F.6:155. G.C.III.72:321. Gt.41:149. R. H.1912:126, 127. Gs.3:237,t(c). J.H.29:f.81(h). Japan, C. China. Intr. 1881. Zone V.—Tree with handsome lvs. turning brilliant red or purple in autumn.

52. **A. grìseum** Pax. Paperbark M. Tree to 8 m., with cinnamon-brown bark separating in thin papery flakes; young brts. pubescent, becoming glabrous: lfts. elliptic to ovate-oblong, 3–6 cm. long, acute, the middle one short-stalked coarsely toothed with large bluntish teeth, the lateral ones subsessile, oblique at base, lobulate on the outer margin: fls. in few-fld. short-peduncled pubescent cymes: fr. pendulous, the wings spreading at an acute or nearly right angle, with the thick tomentose nutlet about 3 cm. long. Fl.v; fr.ix. R.H.1912:127. G.C.III.72:251. Gn.86:543(h);88:816;89:20(h). (*A. nikoense* var. *g.* Franch.) W. China. Intr. 1901. Zone V.—Remarkable for its flaky bark resembling that of the River Birch.

53. **A. mandshùricum** Maxim. Manchurian M. Shrub or small tree to 10 m.; brts. glabrous: lfts. oblong to oblong-lanceolate, 5–10 cm. long, acuminate, the middle one slender-stalked, the lateral ones short-stalked, obtusely serrate, dark green above, glaucous beneath and pubescent on the midrib, otherwise glabrous; petiole glabrous, 6–10 cm. long, red: fls. greenish yellow, in 3–5-fld. cymes: fr. glabrous; wings spreading at a right or obtuse angle, with the thick reticulate nutlets 3–3.5 cm. long. Fl.v; fr.ix. N.K.1:t.10. S.H.2:f.139d,140r. Trans. R. As. Soc. Kor. Br. 9:t.19(h). Manch., Korea. Cult. 1904. Zone V or IV.—Graceful Maple; the red petioles forming a pleasing contrast to the dark green lvs.

A closely related species is **A. sutchuenénse** Franch. Lfts. larger, the lateral ones longer stalked, sparingly pubescent beneath: infl. many-fld., dense: fr. with the wings upright, curved, about 2.5 cm. long. S.T.2:t.112. S.H.2:f.139a,140p-q. (*A. sutchuense* Pax.) W. China. Intr. ?

Group XIV. Negundo K. Koch. Fls. dioecious; in lateral racemes from leafless or occasionally leafy buds, or the staminate ones clustered, 4- or 5-merous, with petals or without; stamens 4–6; disk wanting: lvs. 3–7-foliolate: winter-buds with 2 outer scales.

54. **A. Hénryi** Pax. Small tree to 10 m.; brts. slightly pubescent when young, soon glabrous: lfts. 3, stalked, elliptic, 6–10 cm. long, acuminate, cuneate, remotely dentate, pubescent rarely nearly glabrous beneath; petiole 5–10 cm. long: fls. nearly sessile, in slender pendulous racemes, sometimes with small lvs. at base: fr. glabrous, in pendulous racemes with the peduncle 10–20 cm. long; wings upright or slightly spreading, with the thick nutlet 2–2.5 cm. long. Fl.iv; fr.ix. H.I.19:1896. G.C.III.77:193. J.H.29:f.93(h),96 (as *A. sutchuenense*). C. China. Intr. 1903. Zone V.

55. **A. cissifólium** K. Koch. Small tree to 10 m.; young brts. pubescent: lfts. 3, stalked, ovate or obovate to elliptic, 5–8 cm. long, acuminate, coarsely and unequally serrate, sparingly ciliate, light green and glabrous or nearly so beneath; petiole 5–8 cm. long, glabrous: fls. very small, on pedicels 3–6 mm. long, in slender pubescent racemes 5–10 cm. long: fr. glabrous, in pendulous racemes; wings spreading at an acute angle, with the thick nutlet 2.5 cm. long. Fl.iv; fr.ix. S.I.2:t.41(c). J.C.32,1:t.15. S.H.2:f.139f,140b-d. D.L. 2:465(l). (*Negundo c.* Sieb. & Zucc.) Japan. Intr. 1875. Zone VI?—Graceful round-headed tree; the lvs. turning red and yellow in autumn.

56. **A. Negúndo L.** Box-Elder. Tree to 20 m.; brts. glabrous: lvs. pinnate; lfts. 3–5, rarely 7 or 9, ovate to lance-oblong, 5–10 cm. long, acuminate, coarsely serrate or the terminal one 3-lobed, bright green, lighter green below and slightly pubescent or nearly glabrous; petiole 5–8 cm. long: fls.

yellowish green, before the lvs.; the staminate ones corymbose, on slender pendulous pubescent stalks 2–3.5 cm. long; the pistillate ones slender-pediceled, in pendulous racemes: fr. glabrous; wings diverging at an acute angle and usually incurved, with the thick nutlet 2.5–3.5 cm. long. Fl.III–IV; fr.IX. S.O.1:t.12(c). M.S.1:t.46(c). F.D.16:1528a(c). S.S.2:t.96. G.G.2:t.175. Storrs Agr. Exp. Sta. 69:547(h). (*Negundo fraxinifolium* Nutt., *N. aceroides* Moench, *Rulac N.* Hitchc.) The typical form from N. Eng. and Ont. to Minn., Neb., Kans., Tex. and Fla. Cult. 1688. Zone II or I.—Var. **variegàtum** Carr. Lvs. with broad white margin. F.S.17:t.1781(hc). Gn.68:402(h). G.2:37;11:97(h). (Var. *argenteo-variegatum* Bonamy.) Probably the most effective of all variegated hardy trees.—Var. **aureo-variegàtum** Booth. Lvs. spotted golden yellow.—Var. **aureo-marginàtum** Dieck. Lvs. margined yellow. R.B.32:197,t,f.5(c).—Var. **auràtum** Spaeth. Lvs. yellow. R.B.32:197, t.f.3(c). (Var. *odessanum* Hort., var. *californicum aureum* Hort.)—Var. **pseudo-californicum** Schwer. Brts. green, bloomy; of vigorous growth. (*A. californicum* Hort., *A. Negundo* var. *californicum* Kirchn.)—Var. **violàceum** Kirchn. , Brts. purplish or violet with glaucous bloom: lfts. 3–11, usually 5–7, usually pubescent beneath; of vigorous growth. Chiefly in the northwestern part of the range of the species. (*A. californicum* Hort.)—Var. **intérius** Sarg. Brts. with short pale pubescence, rarely nearly glabrous: lfts. 3, slender-stalked, glabrous beneath or villous on the midrib. B.T.655. (*A. interior* Brit.) Alb. and Sask. to Ariz. and N. Mex. Intr. 1914.—Var. **californicum** Sarg. Brts. and winter-buds hoary-tomentose: lfts. 3, coarsely serrate or nearly entire, pubescent above and tomentose beneath when young, at maturity densely pubescent beneath: fr. puberulous or glabrous, the nutlet not constricted at base. N.S.2:t.72(c). S.S.2:t.97. (*A. c.* Dietr., *Negundo c.* Torr. & Gr.) Calif. Cult. 1865. Zone VII?—One of the hardiest Maples and drought resisting, much planted in the Northwest for shelter-belts. Several of the varieties are favorite ornamental trees; of rapid growth when young.

Fam. 57. **HIPPOCASTANACEAE** DC. HORSE-CHESTNUT FAMILY.

Trees or shrubs: lvs. opposite, digitately 3–9-foliolate or pinnate, estipulate: fls. andro-polygamous, irregular, in terminal panicles; sepals 4–5, distinct or connate, imbricate: petals 4 or 5, unequal, clawed; stamens 5–9, distinct; disk extrastaminal; ovary superior, 3-celled, with 2 ovules in each cell; style and stigma 1: fr. usually 1-celled, dehiscent, 3-valved, usually 1-seeded; seeds very large, with a large hilum, exalbuminous. Three genera with more than 25 species in the temp. regions of the n. hemisphere, in Am. s. to n. S. Am.—Besides Aesculus the Chinese genus *Bretschneidera* may be hardy in the southern part of our area, but it is not yet in cult.

AÈSCULUS L. Horse-chestnut, Buckeye. Deciduous trees or shrubs: winter-buds large, with several pairs of outer scales: lvs. long-petioled, digitately 5–9-foliolate, serrate: fls. in upright many-fld. panicles; calyx campanulate to tubular, 4–5-toothed; petals 4–5, with long claws. (Ancient Latin name of an Oak or mast-bearing tree.) About 25 species in N. Am., S. E. Eu. and E. Asia to India.—Ornamental trees chiefly grown for their showy fls. and also for their handsome large foliage.

A. Winter-buds resinous; claws of petals not longer than calyx; stamens exserted.
B. Lfts. sessile (short-stalked in No. 2); petals 5. (Sect. I. HIPPOCASTANUM K. Koch.)
C. Lfts. obtusely double-serrate, green beneath: fr. subglobose.
D. Fls. white, spotted red: fr. echinate.....1. *A. Hippocastanum*
DD. Fls. flesh-colored to scarlet: fr. with few small prickles.....2. *A. carnea*

cc. Lfts. nearly equally crenate-serrate, glaucescent beneath: fls. yellowish white: fr. broadly pear-shaped, warty.....3. *A. turbinata*
bb. Lfts. stalked: petals 4; calyx 2-lipped: fr. pear-shaped, smooth. (Sect. II. CALOTHYRSUS K. Koch.)
c. Corolla about 1 cm. long, white.....4. *A. Wilsonii*
cc. Corolla about 2.5 cm. long, white to pink: lvs. glabrous.....5. *A. californica*
aa. Winter-buds not resinous: claws mostly longer than the 5-toothed calyx.
b. Fls. yellow to scarlet; stamens shorter to slightly longer than the 4 petals: lfts. petioled. (Sect. III. PAVIA K. Koch.)
c. Petals villous at the margin (or interspersed with glands in some hybrid forms); calyx campanulate. (Ser. I. OCTANDRAE Sarg.)
d. Petals without glands on the margin.
e. Fr. prickly: fls. yellow; petals of nearly equal length, shorter than stamens. 6. *A. glabra*
ee. Fr. without prickles: fls. yellow or red; petals of unequal length, longer than stamens at least the upper ones.
f. Pedicels and calyx glandular-villous: fls. usually yellow: large tree. 7. *A. octandra*
ff. Pedicels and calyx not glandular: fls. usually red and yellow: small tree or shrub.....8. *A. neglecta*
dd. Petals with hairs and glands on the margin.....9. *A. hybrida*
cc. Petals glandular on the margin; calyx tubular: fls. red or red and yellow. (Ser. 2. EUPAVIAE Sarg.)
d. Lvs. glabrous or only pubescent on the midrib beneath.....10. *A. Pavia*
dd. Lvs. tomentose or densely pubescent beneath.
e. Lfts. usually oblong-obovate, tomentose beneath: seed light yellowish brown. 11. *A. discolor*
ee. Lfts. usually lanceolate or oblanceolate, hoary pubescent beneath: seed dark chestnut-brown.....12. *A. splendens*
bb. Fls. white, small; stamens more than twice as long as the 4–5 petals. (Sect. IV. MACROTHYRSUS K. Koch.).....13. *A. parviflora*

1. †A. Hippocástanum L. COMMON H. Tree to 25 m.; brts. usually glabrous: lfts. 5–7, cuneate-obovate, 10–25 cm. long, acuminate, obtusely double-serrate, rusty floccose-tomentose near base beneath when young: fls. white, tinged with red, about 2 cm. across, in panicles 20–30 cm. long: fr. echinate, about 6 cm. across, with 1 or 2 seeds. Fl. v–vi; fr. viii–ix. F.D.21:2117(c). H.W.3:36,37(h),t.47(c). E.H.2:t.63–65(h). F.E.13:t.13(h). Am. For. 19:145, t(h); 21:862(h). Balkan Pen. Intr. 1576. Zone V.—Var. **Baumánnü** Schneid. Fls. double, white. I.H.2:50. A.G.32:271(h).—Var. **luteo-variegàta** West. with yellow- and var. **albo-variegata** West. with white-variegated lfts. are of little ornamental value.—Var. **laciniàta** Leroy. Lfts. narrow, deeply and irregularly incised. (Var. *dissecta* Hort., var. *heterophylla* Hort., var. *asplenii-folia* Hort.)—Var. **pyramidàlis** Nichols. Of compact, narrow-pyramidal habit. —Var. **umbraculífera** Rehd. With a compact round head. M.G.1903:188(h). —Var. **péndula** Pinelle. With pendulous brs. E.H.2:t.64(h). R.H.1921: 281(h).—One of the most showy flowering trees and much planted as shade and street tree.

2. × A. cárnea Hayne (*A. Hippocastanum* × *Pavia*). RED H. Tree to 15 or 25 m.; buds slightly viscid; brts. glabrous: lfts. usually 5, subsessile or short-stalked, cuneate-obovate, 8–15 cm. long, dark green and somewhat lustrous above, nearly glabrous beneath: fls. flesh-colored to deep red, in panicles 12–20 cm. long; petals glandular and villous on the margin: fr. subglobose, 3–4 cm. across, slightly prickly. Fl.v–vi; fr.ix. G.O.t.22(c). L.D.6:t.357(c). B.R.1056(c). L.B.1242(c). F.S.t.2229–30(c). M.A.t.64(h). F.E.23:607(h). (*A. rubicunda* Loisel., *A. intermedia* André.) Orig. before 1818. Zone V.—Var. **péndula** Henry. With pendulous brs.—Var. **Briòtii** Nichols. With bright scarlet fls. R.H.1878:370,t(c). (*A. rubicunda* var. *Briotii* Carr.) Orig. 1858.—Var. **plantierénsis** Rehd. Lfts. usually 7, to 20 cm. long, bluntly serrate: fls. whitish, suffused with pink and fading to pink: fr. prickly. (*A. p.* André.) Orig. before 1894.—Ornamental round-headed tree, often planted; the lvs. are of darker color and firmer texture and resist drought better than those of the preceding species.

3. **A. turbinàta** Bl. JAPANESE H. Tree to 30 m.: lfts. 5–7, cuneate-obovate, 20–35 cm. long, acuminate, nearly equally crenate-serrate, glaucescent beneath and glabrous except axillary tufts of hairs or pubescent on the veins; petiole glabrous or pubescent: fls. about 1.5 cm. across, yellowish white, with a red spot, in a panicle 15–25 cm. long: fr. broadly pear-shaped, about 5 cm. across, warty; seed brown, about 3 cm. across, with a large hilum covering nearly ½ of the seed. Fl.VI; fr.IX. B.M.8713(c). S.I.1:t.71(c). G.C.III.5:717;31:187. E.H.2:t.66(h). Japan. Intr. before 1880. Zone V.—Var. **pubéscens** Rehd. Lvs. more or less villous-pubescent beneath. Cult. 1911.—Fls. less showy than those of *A. Hippocastanum*, but lvs. larger.

4. **A. Wilsònii** Rehd. Tree to 25 m.; brts. densely pubescent: lfts. oblong-obovate or oblong-oblanceolate, 10–22 cm. long, acuminate, rounded or broad-cuneate, closely serrulate, densely grayish pubescent beneath when young, glabrescent at maturity: fls. 1.2–1.5 cm. long, white, the upper petals with a yellow spot, in cylindric panicles 15–30 cm. long: fr. ovoid or obovoid, apiculate, with thin walls; seed 3–3.5 cm. across, the hilum occupying about ⅓ or less of it. Fl.V–VI; fr.IX. C.C.234. S.H.2:f.171f,173b-c. U. S. Inv. 53:t.3(h). (*A. chinensis* Diels, not Bge.) C. and W. China. Intr. 1908. Zone VI or VII.—Handsome species with its long cylindric spikes of white fls.

A closely related species is **A. chinénsis** Bge. Brts. glabrous: lfts. shorter-stalked, cuneate, glabrous beneath, except sparingly hairy on the veins: fls. about 1 cm. long: fr. subglobose, somewhat depressed, with thick walls; seed 2–2.5 cm. across, the hilum occupying about ½ of it. M.A.t.15bis(c, fr. and winter-buds). G.C.III.52:346, 347(h). N. China. Cult. 1877, intr. again 1882 and 1912. Zone V.

5. **A. califórnica** Nutt. CALIFORNIAN B. Tree to 12 m.: lfts. 5, sometimes 7, elliptic-oblong to lance-oblong, 8–14 cm. long, acuminate, narrowed or rounded at base, sharply serrate, glabrous; petiolules 1–2.5 cm. long: fls. white to rose-colored, fragrant, about 2.5 cm. long, in dense rather narrow panicles 8–20 cm. long; stamens long-exserted; petals of equal length: fr. obovoid, 5–7 cm. long. Fl.IV–VIII; fr.VIII–IX. B.M.5577(c). S.S.2:t.71,72. G.C.III.31:186. Gn.49:490, 492(h). G.M.55:577(h). (*Pavia c.* Hartw.) Calif. Intr. 1855. Zone VII or VIII?

A related species is **A. índica** Colebr. Tree to 20 m.: lfts. 5–9, short-stalked, obovate-lanceolate, 15–25 cm. long, finely serrate: fls. white, marked red and yellow, the lower part of the unequal petals tinged rose. B.M.5117(c). B.S.1:171. G.C.III.33:139,t;36:206,t(h);72:19. Gn.84:319. R.H.1917:248. Himal. Intr. 1851. Zone VII?

6. **A. glábra** Willd. OHIO B. Small tree to 10 m.: lfts. 5, elliptic to obovate, 8–12 cm. long, acuminate, cuneate, finely serrate, pubescent beneath when young, nearly glabrous at maturity: fls. pale greenish yellow, 2–3 cm. long, in panicles 10–15 cm. long; petals of nearly equal length, their claws as long as calyx; stamens exserted: fr. obovoid, 3–5 cm. long, echinate. Fl.V; fr.IX. B.R.24:51(c). S.S.2:t.67,68. F.E.29:773(h). Am. For. 24:155. (*A. ohioensis* Michx., *Pavia g.* Spach.) Pa. to Neb., Kansas and Ala. Cult. 1809. Zone V.—Var. **pallida** K. Koch. Lfts. with persistent pubescence beneath. (*A. p.* Willd.) Cult. 1809.—Var. **leucodérmis** Sarg. Tree to 20 m.; bark nearly white: lfts. glabrous and pale green or glaucescent beneath: fls. later. Mo., Ark. Intr. 1901.—Var. **Sargentii** Rehd. Shrub: lfts. 6–7, obovate-lanceolate, more acuminate, finely pubescent beneath. (*A. g.* var. *Buckleyi* Sarg., 1905, not 1902; var. *arguta* Robins., in part.) Ohio to Kans., Mo. and Miss. Intr. 1895.—Var. **montícola** Sarg. Lfts. often 6 or 7, glabrous beneath or puberulous on midrib when young: fr. subglobose, 1.5–2 cm. across, usually 1-seeded. Okl. Intr. 1922.—Handsome small tree; lvs. turning yellow in autumn.

A. glabra × *octandra* = **A. marylándica** Booth. Orig. unknown.—*A. g.* × *hybrida* = *A. arnoldiana;* see under No. 9.—*A. g.* × *Pavia* = *A. mississippiensis;* see under No. 9.—*A. g.* × *discolor* = *A. Bushii;* see under No. 9.

A closely related species is **A. argûta** Buckl. Shrub to 2 m.; lfts. 7–9, lanceolate to obovate-lanceolate, 6–12 cm. long, deeply and doubly serrate with obtuse teeth, pubescent beneath when young, finally glabrescent: fls. light yellowish green. S.T.2:t.198. (*A. glabra* var. *a.* Robins., *A. g.* var. *Buckleyi* Sarg., 1902 partly.) E. Tex. Intr. 1909. Zone V.

7. **A. octándra** Marsh. SWEET B. Tree to 20 or 30 m.: lfts. 5, oblong-obovate or narrow-elliptic, 10–15 cm. long, acuminate, cuneate, finely serrate, dark green above, yellow green and pubescent beneath when young, nearly glabrous at maturity: fls. yellow, 3 cm. long, in panicles 10–15 cm. long; petals very unequal, their claws longer than the calyx; stamens usually 7, shorter than petals: fr. subglobose, 5–6 cm. across, usually 2-seeded. Fl. V–VI; fr. IX. L.B.1280(c). S.S.2:t.69,70. M.A.t.65(h). G.W.7:145(h). (*A. flava* Ait., *A. lutea* Wangh., *Pavia lutea* Poir.) Pa. to Ga. and Ill. Intr. 1764. Zone IV.—Var. **virgínica** Sarg. Fls. red, pink or cream-colored. W. Va. Intr.?—Var. **vestìta** Sarg. Lfts. beneath, petioles and young brts. pubescent or tomentose. N. C. and W. Va. Cult. 1893. Zone V.

A. o. × *glabra* = *A. marylandica;* see under No. 6.—*A. o.* × *Pavia* = *A. hybrida;* see No. 9.

A related species is **A. glaucéscens** Sarg. Shrub to 10 m. Lfts. larger, glabrous and glaucescent beneath: fls. larger; fr. smaller. S.T.2:t.196. Ga. Intr. 1914. Zone V.

8. **A. neglécta** Lindl. Tree to 20 m.: lfts. 5, oblong-obovate, 10–16 cm. long, long-acuminate, simply or sometimes irregularly doubly serrulate, light yellowish green beneath and glabrous except axillary tufts of hairs, rarely without; petiolules 3–8 mm. long, puberulous above; petiole puberulous above, at least near apex: panicles 10–15 cm. long; calyx narrow-campanulate, puberulous: petals very unequal, pale yellow, marked with red veins toward the base; stamens villous below the middle: fr. globose, 2.5–3 cm. across, usually 1-seeded. Fl. V–VI; fr. IX. B.R.1009(c). H.B.1:209. N. C. Cult. 1826. Zone V.—Var. **georgiàna** Sarg. Usually shrubby: panicle broader and denser; calyx often nearly tubular; petals yellow and red, sometimes entirely bright yellow or red. S.T.2:t.197. S.M.706. (*A. g.* Sarg.) N. C. to Fla. and Ala. Intr. 1905.—Var. **lanceolàta** Sarg. Lfts. lanceolate or nearly oblanceolate: fls. bright red. S.M.707. Ga. Intr. 1917.—Var. **pubéscens** Sarg. Lfts. pubescent beneath: fls. yellow and red. N. C. to Ga. and Ala. Intr. 1905.—Var. **tomentòsa** Sarg. Lfts. tomentose or densely villous beneath: fls. bright red. (*A. Michauxii* Hort., *A. discolor* Hort., not Pursh.) S. C. Cult. 1880.—Large shrub or tree with large panicles of showy fls., particularly the vars.

A. n. × *Pavia* = *A. Dupontii;* see under No. 9.—*A. n.* × *discolor* = *A. mutabilis;* see under No. 9.

A related species or hybrid of unknown origin is **A. woerlitzénsis** Koehne. Tree: lfts. oblong-obovate, 10–16 cm. long, yellowish green beneath, sparingly hairy along the midrib and bearded in the axils of the veins, with 17–20 pairs of veins: fls. red, in panicles 10–12 cm. long: calyx tubular; the lateral petals with an oblong-obovate blade cuneate at base. Cult. 1910.—Var. **Ellwángeri** Rehd. Lfts. 12–18 cm. long, slightly pubescent beneath while young, with 20–27 pairs of veins: fls. darker red; calyx narrower, not widened above the middle. (*A. Pavia* var. *Whitleyi* Ellw. & Barry, not Hort. Angl., *A. Pavia atrosanguinea* Hort.) Cult. 1901.

9. × **A. hýbrida** DC. (*A. octandra* × *Pavia.*) HYBRID B. Tree: lfts. 5, oblong-obovate or oblong-elliptic, 10–15 cm. long, acuminate, minutely crenate-serrate, pubescent beneath along the midrib and veins: fls. yellow and reddish in panicles 10–16 cm. long; pedicels and calyx stipitate-glandular; stamens shorter than petals, villous toward the base: fr. subglobose. Fl.

v–vi; fr.ix. W.D.2:164(c, as *A. Pavia*). (*A. versicolor* Wender., *A. Lyoni* Hort., *A. discolor* Hort., *Pavia h.* Spach.) Orig. before 1815.—Several forms of this hybrid are in cult. varying in color of the fls. from yellow slightly tinged pink to nearly red.

Other hybrids between the species of the Octandrae and Eupaviae with the petals villous and glandular on the margin are the following of which the first three have the fr. slightly tuberculate and the lvs. in the first and 2d species glabrous and in the 3d pubescent beneath, while the 4th has a smooth fr. and glabrous lvs. and the 5th a smooth fr. and the lvs. pubescent beneath.—**A. arnoldiàna** Sarg. (*A. glabra* × *hybrida.*) Lfts. elliptic, finely, often doubly serrate, pubescent only along the midrib beneath; calyx campanulate, yellow; petals yellow, the upper marked with red; stamens as long or slightly longer than petals: fr. with scattered short prickles or tubercles. Orig. about 1900.—**A. Bùshii** Schneid. (*A. glabra* × *discolor*). Tree: brts. and petioles puberulous: lfts. finely and bluntly serrate, pubescent beneath; calyx red; petals yellow and pink; stamens longer than petals: fr. slightly tuberculate, Ark., Miss. Intr. 1901.—**A. mississippiénsis** Sarg. (*A. glabra* × *Pavia*). Lfts. elliptic to oblong-obovate, finely and often doubly serrate, glabrous except axillary tufts of hairs beneath: fls. dark red and yellow; calyx narrow-campanulate; stamens usually longer than petals: fr. slightly tuberculate. Miss. Intr. 1913.—**A. Dupóntii** Sarg. (*A. neglecta* × *Pavia*). Lfts. oblong-obovate to elliptic, acutely serrate, light green beneath and glabrous except axillary tufts of hairs, with 18–25 pairs of veins: calyx narrow-campanulate, red; petals yellow or slightly tinged with red; stamens shorter than petals. Orig. after 1820.—Var. **Héssei** Sarg. (*A. n. georgiana* × *Pavia*). Lfts. elliptic or elliptic-obovate; panicles compact; petals yellow, tinged with red. Cult. 1909.—**A. mutàbilis** Schelle (*A. discolor mollis* × *neglecta georgiana*). Lfts. elliptic-oblong, pale and villous beneath: panicles 12–15 cm. long; calyx narrow-campanulate to tubular, red; petals red and yellow. (*Pavia m.* Spach.) Cult. 1834.—Var. **Harbisònii** Rehd. Lfts. sparingly villous beneath while young and glaucescent: fls. bright red, in panicles 15–20 cm. long; calyx tubular. (*A. H.* Sarg.) Intr. 1905.—Var. **indùta** Sarg. (*A. discolor mollis* × *neglecta*). Lvs. densely villous and glaucescent beneath. (*A. rosea nana* Hesse.) Cult. 1904.—Var. **penduliflòra** Sarg. Lfts. oblong-lanceolate, pale green and soft-pubescent beneath: panicles loose, slightly pendulous, 14–16 cm. long; calyx tubular, reddish; petals yellow. (*A. humilis* × *lutea* Spaeth.) Cult. 1902.

10. **A. Pàvia** L. Red B. Shrub or tree to 6, rarely to 12 m.: lfts. 5, short-stalked, oblong-obovate or narrow-elliptic, 8–14 cm. long, acuminate, irregularly and often doubly serrate, glabrous or slightly pubescent beneath: fls. bright red, in loose panicles 10–16 cm. long; calyx tubular, dark red; petals very dissimilar, connivent; stamens usually 8, nearly as long as petals; fr. subglobose or obovoid. Fl.vi; fr.ix. L.B.1257(c). S.T.2:t.199. S.M.708. (*Pavia rubra* Poir., *P. Michauxii* Spach.) Va. to Fla. and La. Intr. 1711. Zone V.—Var. **atrosanguínea** Rehd. Fls. dark red.—Var. **húmilis** Mouillef. Low, sometimes prostrate shrub; lfts. slightly pubescent beneath on veins and veinlets: fls. red, in small panicles. B.R.1018(c). (*A. h.* Lodd., *A. Pavia* var. *nana* Dipp., *Pavia rubra* var. *h.* Loud., *P. r. h. pendula* Loud.) Cult. 1826.—Handsome shrub with bright red but comparatively small fls.

A. P. × *Hippocastanum* = *A. carnea;* see No. 2.—*A. P.* × *octandra* = *A. hybrida;* see No. 9.—*A. P.* × *glabra* = *A. mississippiensis;* see under No. 9.—*A. P.* × *neglecta* = *A. Dupontii;* see under No. 9.

11. **A. díscolor** Pursh. Shrub or small tree to 10 m.; lfts. 5, short-stalked, elliptic to oblong-obovate, 8–18 cm. long, acuminate, finely crenate-serrate, dark green and lustrous above, whitish tomentose or tomentulose beneath; fls. yellow and red, about 3 cm. long, in narrow pubescent panicles 15–20 cm. long; calyx tubular, red or yellow, tinged with red; petals very unequal, connivent, shorter than stamens: fr. usually obovoid, 3.5–6 cm. long; seeds usually 2, light yellow-brown. Fl.v–vi; fr.ix. B.R.310(c). S.S.13:622. (*A. Pavia* var. *d.* Torr. & Gr., *A. octandra* var. *hybrida* Sarg.) Ga. to Mo. and Tex. Intr. about 1812. Zone V.—Var. **móllis** Sarg. Fls. bright red. (*A. m.*

Raf., *A. austrina* Small.) N. C. to Fla. and Tex. Intr. 1905.—Var. **Koèhnei** Rehd. Low shrub; fls. red and yellow. (*A. humilis* Koehne, not Lodd., *A. Pavia* var. *humilis* Voss, partly.) Cult. 1893.—Var. **flavéscens** Sarg. Fls. yellow. Tex. Intr.?—Ornamental shrub with large panicles of bright colored fls.

A. d. × *neglecta* = *A. mutabilis;* see under No. 9.

13. **A. spléndens** Sarg. Shrub to 4 m.: lfts. 5, lanceolate to oblanceolate, 8–14 cm. long, acuminate, finely and often doubly crenate-serrulate, densely hoary-pubescent beneath, rufous-pubescent in autumn: fls. 3.5–4 cm. long, in panicles 10–20 cm. long; calyx tubular, 7–8 mm. in diam., bright red; petals scarlet, very unequal; stamens longer or shorter than petals: fr. subglobose to short-obovoid; seeds dark chestnut-brown. Fl.v; fr.ix. S.T.2:t. 200. Ala. to Miss. and La. Intr. 1911. Zone VI?—Apparently the handsomest of all Buckeyes.

14. **A. parviflòra** Walt. Spreading shrub to 4 m.: lfts. 5–7, nearly sessile, elliptic to oblong-obovate, 8–20 cm. long, acuminate, crenate-serrulate, grayish pubescent beneath: fls. white, about 1 cm. long; stamens usually 7, pinkish white, 3–4 cm. long, in long cylindric panicles 20–30 cm. long: fr. obovoid, 2.5–4 cm. long; seed chestnut-brown. Fl.vii–viii; fr.x. B.M.2118(c). Add. 2:t.63(c). G.C.III.31:189;64:33(h). Gn.63:299;79:436(h). Gn.M.9:76(h). B.S.1:173(h). (*A. macrostachya* Michx., *Pavia alba* Poir.) S. C. to Ala. and Fla. Intr. 1785. Zone V.—Valued for its late showy fls.; excellent as a lawn shrub.

Fam. 58. SAPINDACEAE Juss. SOAPBERRY FAMILY.

Trees or shrubs, rarely herbs: lvs. alternate or sometimes opposite, usually abruptly pinnate or odd-pinnate, sometimes bipinnate or 3-foliolate, estipulate: fls. unisexual or apparently polygamous, regular or irregular, small, rarely conspicuous, usually in panicles; sepals 4–5, imbricate, rarely valvate; petals 4–5, sometimes wanting, usually with scales or hairs inside near base; disk well developed, extrastaminal; stamens usually 8 or 10 in 2 whorls, rarely 7 or 6, more or less united at base; ovary superior, mostly 3-celled and deeply 3-lobed; cells usually 1-ovuled; style 1: fr. a caps., berry, drupe, nut or winged fr.; seeds exalbuminous. About 120 genera with more than 1000 species mostly in trop. regions, only few species extending into the temp. zone.

A. Lfts. entire: fls. small, regular, in large panicles: fr. berry-like.....1. *Sapindus*
AA. Lfts. serrate: fls. irregular, conspicuous: fr. capsular.
B. Lvs. twice pinnate or lfts. incised and lobed: fls. yellow, in large panicles after the lvs. 2. *Koelreuteria*
BB. Lvs. simply pinnate: lfts. serrate: fls. before the lvs.
C. Lfts. 9–17: fls. white, in dense racemes.....3. *Xanthoceras*
CC. Lfts. 5–7, large: fls. rose-colored, in cymes.....4. *Ungnadia*

1. **SAPÍNDUS** L. Soapberry. Deciduous or evergreen trees or shrubs; winter-buds with few outer pubescent scales: lvs. alternate, abruptly pinnate (simple in one species); lfts. entire, rarely serrate: fls. small, regular, polygamo-dioecious, in ample terminal or axillary panicles; sepals and petals 4–5, the latter with 1 or 2 scales above the claw, or without; disk annular; stamens 8–10; usually only 1 carpel developing into a drupe; seed usually globose. (Name contracted from *Sapo indicus*, Indian Soap.) About 15 species in the Tropics, few extending into temp. regions.

S. Drummóndii Hook. & Arn. Wild China-tree. Deciduous tree to 15 m., with scaly red-brown bark; young brts. pubescent: lfts. 8–18, short-

stalked, obliquely lanceolate, 4–7 cm. long, acuminate, glabrous above, pubescent beneath; rachis marginless: fls. yellowish white, about 5 mm. across, in loose pubescent panicles 15–25 cm. long; sepals acute, ciliate, shorter than the obovate petals pubescent inside; filaments villous: fr. subglobose, 1–1.5 cm. across, yellow with semitranslucent flesh, finally black. Fl.v–vi; fr.ix–x. S.S.2:t.76,77. B.B.2:500. S. Mo., Kans., N. Mex. and Ariz. to La., Tex. and n. Mex. Cult. 1900. Zone (V).—Of little ornamental value, but interesting as the hardiest species of this trop. genus.

A related species is **S. mukoróssi** Gaertn. Evergreen tree: lfts. 8–13, oblong-ovate to oblong-lanceolate, 7–14 cm. long, glabrous and reticulate beneath; rachis with narrow margin: fr. about 2 cm. across, yellow or orange-brown, slightly keeled. S.I.1:t.71(c). C.C.236. Japan. Cult. 1877. Zone VIII?—Var. **carinàtus** Radlk. Fr. strongly keeled, fleshier. R.H.1895:304, 305. Am. For. 23:686. (*S. utilis* Trabut.)

2. **KOELREUTÈRIA** Laxm. Deciduous trees; winter-buds small, with 2 outer scales: lvs. alternate, odd-pinnate or bipinnate: lfts. serrate: fls. yellow, irregular, in large terminal panicles; calyx deeply and unequally 5-lobed; petals 4, lanceolate, turned upward, clawed, blade cordate at base and with 2 upturned appendages; disk crenate on the upper margin; stamens 8, sometimes less, with long filaments; style 3-fid at apex, shorter than stamens: fr. a bladdery, loculicidal caps. with papery walls and 3 roundish black seeds. (After Joseph G. Koelreuter, professor of natural history at Karlsruhe; 1733–1806.) Five species in E. Asia.

K. paniculàta Laxm. Tree to 10 m.: lvs. pinnate or sometimes partly bipinnate, to 35 cm. long: lfts. 7–15, ovate to ovate-oblong, 3–8 cm. long, coarsely and irregularly crenate-serrate, at base often incisely lobed, glabrous above, pubescent on the veins beneath or nearly glabrous: fls. yellow, about 1 cm. wide, in broad loose panicles to 35 cm. long: fr. oblong-ovoid, gradually narrowed into the pointed apex, 4–5 cm. long. Fl.vii–viii; fr.ix–x. S.O.4:t.181(c). B.R.330(c). Add.5:t.191(c). G.C.III.2:561. Gng.2:353(h). J.L.27:875(h). (*K. japonica* Sieb.—Pride of India, China-Tree, Varnish-Tree.) China, Korea, Japan. Intr. 1763. Zone V.—Chiefly valued for its conspicuous panicles of yellow fls. appearing in summer.

A closely related species is **K. apiculàta** Rehd. & Wils. Lvs. usually partly bipinnate; the pinnate pinnatifid or pinnate at base, incisely lobed and serrate toward the apex: fr. oblong-ovoid, rounded at apex and apiculate. G.C.III.78:307. C. China. Intr. 1900. Zone V.—Probably not hardy is **K. bipinnàta** Franch. Lvs. bipinnate, with ovate to ovate-oblong, equally serrate lfts. 4–10 cm. long. R.H. 1888:393. Gn.34:305. D.L.2:392. W. China. Intr. about 1900.

3. **XANTHÓCERAS** Bge. Deciduous shrub or tree; winter-buds ovoid, with several outer scales: lvs. alternate, odd-pinnate; lfts. sessile, narrow, usually opposite, serrate: fls. polygamous, regular, in racemes, the upper fls. of the terminal raceme fertile, the lower ones and those of the lateral racemes sterile, or rarely a few fertile at the apex of the latter; sepals 5, oblong, imbricate; petals obovate, clawed, large; disk thin, 5-lobed, each lobe on its back with an upright horn-like appendage half as long as stamens; stamens 8, half as long as petals; ovary with short thick style: fr. a loculicidally 3-valved caps. with thick walls; each cell with several globose, dark brown seeds. (Greek *xanthos*, yellow, and *keras*, horn; alluding to the yellow horn-like processes of the disk.) One species in China.

X. sorbifòlia Bge. Shrub or tree to 8 m., with rather stout upright brs., glabrous: lvs. 14–30 cm. long; lfts. 9–17, narrow-elliptic to lanceolate, 3–5 cm. long, sharply serrate, dark green above, lighter beneath: fls. slender-stalked,

about 2 cm. across, in racemes 15–25 cm. long; petals thin, white, with a blotch at base changing from yellow to red: fr. green, 4–6 cm. across; seed about 1 cm. thick. Fl.IV–V; fr.VIII–IX. B.M.6923(c). R.H.1872:290,t(c). Gn.8:524,t(c);71:298(h). G.C.III.58:90(h);76:77,78(h). G.F.6:285(h). Gng. 12:610, 611. S.L.430(h). Gn.M.32:43(h). N. China. Intr. 1866. Zone V.—Upright shrub with very showy white fls. in spring and handsome lustrous foliage remaining green until late in autumn.

4. **UNGNÀDIA** Endl. Slender shrub or small tree; winter-buds with many imbricate scales: lvs. alternate, odd-pinnate: lfts. serrate, the lateral ones sessile, the terminal stalked: fls. polygamous, irregular, in lateral fascicles or corymbs, before the lvs.; calyx campanulate, 5-lobed; petals 4 or 5, subequal, clawed, the claws villous and at the apex with a crest of fleshy hairs; disk unilateral, tongue-shaped; stamens 7–10, unequal, exserted; ovary stipitate: fr. a loculicidally 3-valved leathery caps.; cells usually 1-seeded. (After Baron Ungnad who introduced the Horse-chestnut to C. Eu.) One species.

U. speciòsa Endl. MEXICAN BUCKEYE. Shrub or tree to 10 m.; brts. pubescent: lfts. 5–9, oblong-ovate to ovate-lanceolate, 8–12 cm. long, acuminate, crenulate-serrate, lustrous dark green above, light green beneath, tomentose when unfolding becoming glabrescent: fls. rose-colored, about 2.5 cm. across, in pubescent fascicles on stalks 3–5 cm. long: fr. broad-pyriform, about 5 cm. across; seeds about 1.5 cm. thick. Fl.IV–V; fr.X. F.S.10:t.1059(c). H.F.1865:231,t(c). Gr.G.2:t.178,179. S.S.2:t.73. N. Mex. and Tex. to n. Mex. Intr. 1848. Zone VII or VI?

Fam. 59. SABIACEAE Bl. SABIA FAMILY.

Trees or shrubs, sometimes climbing: lvs. alternate, odd-pinnate or simple, estipulate: fls. perfect or polygamous, in axillary or terminal cymes or panicles; sepals 5, rarely 3 or 4, free or connate at base, imbricate, unequal; petals 5, rarely 4, imbricate, the inner 2 often much smaller; stamens 5, opposite the petals, all fertile or the 3 outer sterile and changed to staminodes; ovary superior, usually with disk at base, usually 2-, rarely 3-celled, each cell with 2 or 1 ovule: fr. 1-celled, rarely 2-celled, indehiscent; seed solitary, exalbuminous; embryo with folded cotyledons and large curved hypocotyle.—Four genera with about 70 species in trop. Asia and Am.; few species extending into temp. regions of E. Asia.

A. All stamens fertile; fls. in axillary cymes: lvs. simple: climbing shrubs.....1. *Sabia*
AA. Only 2 stamens fertile: fls. in terminal panicles: lvs. simple or pinnate: upright shrubs or trees.....2. *Meliosma*

SÀBIA Colebr. Deciduous or evergreen climbing shrubs; winter-buds small, with pointed persistent scales: lvs. simple, entire: fls. perfect, rarely polygamous, usually whitish or greenish, in axillary corymbs or solitary; calyx deeply 5- or 4-parted, with imbricate segments; petals 5, rarely 4, nearly opposite the sepals, much longer than sepals; stamens 5 or 4, with subulate filaments and small roundish anthers; ovary with a 5-pointed disk at base; style subulate: fr. 1- or 2-seeded and deeply 2-lobed, with the style at base; exocarp slightly fleshy, mesocarp woody and reticulate. (From its Bengal name, *Sabja-lat.*) About 20 species in E. and S. Asia and Mal.

S. Schumanniàna Diels. Scandent shrub to 3 m.; brts. slender, glabrous, green or yellowish: lvs. oblong-lanceolate or oblong, rarely elliptic, 2–10 cm. long, acuminate, broad-cuneate or nearly rounded at base, scarious and

usually crenate-erose at margin, bright green above, lighter green beneath, with 5–8 pairs of ascending veins; petiole 4–10 mm. long: fls. campanulate, greenish, 6 mm. long, in 1–3-fld. cymes on slender peduncles 2.5–4 cm. long; pedicels 3–8 mm. long; petals elliptic-obovate; stamens about as long as petals: fr. reniform, 6–7 mm. across, blue, strongly reticulate. Fl.v; fr.ix. C. and W. China. Intr. 1908. Zone (V)?—Apparently of little ornamental value.

A related species is **S. latifòlia** Rehd. & Wils. Brts. pubescent, soon glabrous: lvs. elliptic to elliptic-oblong, 5–12 cm. long, short-acuminate, pubescent at first, at length only on the veins beneath: fls. in usually 3-fld. cymes on peduncles 1–2.5 cm. long, greenish yellow passing into reddish brown. B.M.8859(c). W. China. Intr. 1908. Zone VII?

MELIÓSMA Bl. Deciduous or evergreen trees or shrubs; winter-buds naked: lvs. simple and with numerous straight veins or odd-pinnate with opposite lfts., serrate or entire: fls. perfect, rarely polygamous, in terminal and axillary panicles; sepals 5, rarely 4, subequal, imbricate, petals 5, very unequal, the outer 3 rounded, imbricate, the inner 2 much smaller, often bifid or scale-like and often adnate to the fertile stamens; stamens 5, the outer sterile and reduced to cup-shaped staminodes; the inner ones fertile, their anthers surrounded at base by the cup-shaped apex of the short filaments: ovary 2, rarely 3-celled, at base surrounded by a disk; style subulate, short: fr. a subglobose to oblong, small, usually 1-seeded drupe, black or red. (Name from Greek *meli*, honey, and *osma*, odor; referring to the fragrant fls.) About 50 species, mostly in trop. E. and S. Asia, also in trop. Amer.

A. Lvs. simple, toothed ..... 1. *M. cuneifolia*
AA. Lvs. odd-pinnate ..... 2. *M. Veitchiana*

1. **M. cuneifòlia** Franch. Shrub or small tree to 6 m.; young brts. slightly pub.: lvs. obovate, 8–16 cm. long, acute or abruptly acuminate, narrow-cuneate and decurrent, sinuately toothed, glabrous above, light green and pubescent on the veins beneath and with axillary tufts of hairs, with 20–25 pairs of straight veins; petiole 8–15 mm. long: fls. yellowish white, 6 mm. across, in upright loose panicles with spreading brs., about 15–25 cm. long and nearly as wide; bracts minute, caducous: fr. black, about 6 mm. across. Fl.vii; fr.ix. B.M.8357(c). B.S.2:78. J.H.40:222;49:t.3(h). G.C.III.59: 279(h). W. China. Intr. 1901. Zone VII?—Handsome in bloom with its large panicles of fragrant whitish fls.

Related species are: **A. myriántha** Sieb. & Zucc. Lvs. elliptic-obovate to oblong-obovate, 10–20 cm. long, short-acuminate, broad-cuneate or sometimes rounded at base, with 24–30 pairs of veins and without axillary tufts of hairs: fls. greenish yellow, smaller, in panicles with ascending brs., 15–20 cm. long; bracts persistent: fr. red. S.I.2:t.46(c). G.C.III.31:30. Japan. Intr. 1879. Zone VIII?—**M. ténuis** Maxim. Lvs. 5–10 cm. long, glabrous beneath except axillary tuft of hairs and sometimes pubescent on the veins, with 10–15 pairs of veins: infl. without the slender stalk 8–15 cm. long; bracts caducous: fr. black. Japan. Intr. 1915.—**M. pendens** Rehd. & Wils. Shrub to 5 m.: lvs. elliptic-obovate, 6–15 cm. long, sparingly hairy above, pilose on midrib and veins beneath, without axillary tufts, with 12–20 pairs of veins: panicles pendulous, 12–20 cm. long with the brts. partly reflexed; bracts caducous; fls. fragrant. C. China. Intr. 1907. Zone VII? —**M. dilleniifòlia** Wall. Tree to 6 m.; brts. pubescent: lvs. obovate to oblanceolate, 12–30 cm. long, aristate-serrulate, slightly rough above, pubescent beneath: panicle 20–30 cm. long; bracts deciduous. Himal. Cult. 1924. Zone VII or VIII.

2. **M. Veitchiòrum** Hemsl. Tree to 15 m., with stout upright brs.; young brts. hairy, soon glabrous, with conspicuous lenticels: lvs. 40–80 cm. long; lfts. 9–11, ovate to ovate-oblong or oblong, 8–16 cm. long, obtuse or short-acuminate, entire, rarely remotely crenate-serrate, glabrous except the pubescent midrib beneath: fls. yellow, 5 mm. across, in drooping panicles 20–40

cm. long: fr. black, subglobose, 6–8 mm. across. Fl.v; fr.ix. Kew Bull. 1910:175(h). C. China. Intr. 1901. Zone VI?—Tree with handsome pinnate lvs. and large drooping panicles of fragrant yellowish fls.

A related species is **M. Beaniàna** Rehd. & Wils. Young brts. brownish tomentose: lvs. 15–30 cm. long; lfts. 5–13, ovate to elliptic-lanceolate, 6–15 cm. long, acuminate, usually cuneate, glabrous beneath except axillary tufts of hairs: fls. creamy white, in very numerous panicles before the lvs., 10–20 cm. long. C. China. Intr. 1908. Zone VI.

Fam. 60. **RHAMNACEAE** Lindl. BUCKTHORN FAMILY.

Trees or shrubs, often spiny, sometimes climbing, rarely herbs: lvs. alternate, rarely opposite, simple, usually stipulate: fls. regular, bisexual or unisexual, small, usually greenish or whitish, in cymes, fascicles or panicles; sepals 5, rarely 4, valvate; petals 4 or 5, sometimes wanting; stamens 5 or 4, opposite the petals; receptacle cup-shaped, lined by the usually well-developed intrastaminal disk; ovary 2–3-celled, rarely 1- or 4-celled, superior or inferior; cells 1-, rarely 2-ovuled; styles 2–4, more or less connate: fr. drupaceous, winged or capsular; seeds usually with scanty albumen, sometimes without; embryo with usually broad, flat cotyledons and small radicle.—About 45 genera and more than 550 species.

A. Stipules changed to spines: lvs. 3-nerved at base.
  B. Fr. dry, winged ..... 1. *Paliurus*
  BB. Fr. fleshy, drupaceous ..... 2. *Zizyphus*
AA. Stipules not spiny.
  B. Lvs. large: brs. unarmed or with spinescent brts.
    C. Fr. with a single, 1-or 2-celled stone, drupaceous; brs. not spiny.
      D. Brs. twining: lvs. entire: fls. in terminal panicles or spikes ..... 3. *Berchemia*
      DD. Brs. not twining: lvs. serrulate: fls. in peduncled terminal and lateral cymes. 4. *Rhamnella*
    CC. Fr. with several, usually 3, stones.
      D. Fls. sessile or subsessile, in clusters forming spikes or panicles: lvs. opposite or nearly opposite: brs. often spiny ..... 5. *Sageretia*
      DD. Fls. pedicelled, usually in axillary clusters or cymes.
        E. Fr. indehiscent, fleshy or leathery.
          F. Infl. not becoming fleshy: lvs. penninerved: fls. greenish ..... 6. *Rhamnus*
          FF. Infl. a large peduncled cyme, its brs. becoming fleshy: lvs. 3-nerved at base, to 16 cm. long ..... 7. *Hovenia*
        EE. Fr. separating at maturity into 3 dehiscent nutlets: lvs. 3-nerved: fls. white, pink or blue ..... 8. *Ceanothus*
  BB. Lvs. small or wanting: brts. with decussate stout spines: fls. campanulate or tubular, in fascicles or solitary.
    C. Lvs. usually persistent: stipules connected by 2 distinct lines ..... 9. *Discaria*
    CC. Lvs. usually deciduous; stipules not connected ..... 10. *Colletia*

1. PALIÙRUS Mill. Deciduous trees or shrubs, sometimes decumbent; stipules usually spiny; winter-buds small, with 2 or 3 outer scales: lvs. alternate, 2-ranked, 3-nerved at base, entire or serrate: fls. perfect, small, 5-merous, in axillary or sometimes terminal cymes; ovary 2–3-celled, united with the receptacle: fr. woody, 2–3-celled, with leathery exocarp, depressed-subglobose and above the middle surrounded by a broad horizontal wing; cells 1-seeded. (Ancient Greek name.) Six species from S. Eu. to E. Asia.

P. spìna-Chrísti Mill. Christ-Thorn. Spreading spiny shrub or small tree to 6 m.; young brts. pubescent; one of the stipular spines straight, the other hooked or recurved: lvs. ovate, 2–3.5 cm. long, obtuse, rounded and usually oblique at base, minutely serrulate or entire, dark green above, glabrous or slightly pubescent on the veins beneath; petioles 4–12 mm. long: fls. greenish yellow in short-peduncles umbel-like cymes; fr. brownish yellow, 2–2.5 cm. across, glabrous. Fl.vi–viii; fr.x–xii. B.M.1893(c),2535(c). N.D. 3:t.17(c). G.C.III.50:377. E.N.III.5:402. G.W.4:318. (*P. Paliurus* Karst., *P. australis* Gaertn., *P. aculeatus* Lam., *Rhamnus Paliurus* L.) S. Eu. to Himal. and N. China. Cult. 1597. Zone VII.—Sometimes grown for its

legendary interest, as it is believed to be the tree from which the Crown of Thorns was made; the curious fr. has the aspect of a low-crowned, wide-brimmed hat; the dark green lvs. and the numerous yellow fls. are attractive.

A related species is **P. orientàlis** Hemsl. Tree to 15 m., sometimes unarmed: lvs. 5–10 cm. long, glabrous: fr. 2.5–3.5 cm. broad. C. China. Intr. 1907. Zone VII?

2. ZÌZYPHUS Mill. Deciduous or evergreen shrubs or trees; winter-buds small, with 2 or few outer scales: lvs. alternate, short-petioled, 3–5-nerved from the base, serrate or entire; stipules usually spiny: fls. usually yellow, small, 5-merous, perfect, in axillary cymes; ovary 2–4-, usually 2-celled; style usually 2-parted; fr. a subglobose to oblong drupe. (*Zizyphon*, ancient Greek name of *Z. jujuba*.) About 40 species in trop. and subtrop. regions of both hemispheres.

Z. jujùba Mill. Common Jujube. Shrub or small tree to 10 m.; glabrous; one spine slender, to 3 cm. long, the other decurved; brts. often fascicled and resembling pinnate lvs.: lvs. oblong-ovate to ovate-lanceolate, rarely ovate, 2–6 cm. long, acutish or obtuse, oblique and 3-nerved at base, crenate-serrulate, glabrous, firm; petiole 1–5 mm. long: fls. yellow, 2–3, axillary, short-stalked: fr. dark red or finally almost black, ovoid to oblong, 1.5–2.5 cm. long, short-stalked. Fl.iv–v; fr.ix–x. N.D.3:t.16(c). S.O.3:t.152(c). E.N. III.5:403g-h. F.E.19:395,t.96(h). U.S. Im.47:t(h). N.K.9:t.2. (*Z. Zizyphus* Karst., *Z. vulgaris* Lam., *Z. sativa* Gaertn., *Rhamnus Zizyphus* L.) S. E. Eu. to S. and E. Asia; nat. in Ala. Intr. about 1640. Zone (V), VII.—The frs. are edible and the tree is cult. in the Mediterr. region; it has no particular ornamental qualities.—Var. **inérmis** Rehd. Brs. unarmed. N.K.9:t.3. (*Z. vulgaris* var. *i.* Bge.)

The related **Z. mauritiàna** Lam. (*Z. jujuba* Lam.) has the brts. and the under side of the lvs. tomentose and is probably not hardy within our area.

3. BERCHÈMIA Neck. Deciduous twining shrubs; winter-buds small, with 2 or 3 outer scales: lvs. alternate, entire or nearly so, penninerved with conspicuous parallel veins; stipules subulate: fls. perfect, small, 5-merous, in terminal panicles; ovary free, 2-celled; style 2-parted: fr. an oblong or cylindric drupe, with a 2-celled stone. (Derivation of name uncertain.) About 12 species in S. and E. Asia, E. Afr. and N. Am.

A. Lvs. rounded at base, with 9–12 pairs of veins: panicles short.....1. *B. scandens*
AA. Lvs. subcordate at base, with 6–8 pairs of veins; panicles large.....2. *B. racemosa*

1. B. scandens K. Koch. Supple-Jack. Shrub to 5 m.: lvs. elliptic-ovate to oblong-ovate, 3–8 cm. long, acute to obtuse, often undulate; petiole to 1 cm. long: fls. greenish white, in terminal panicles 1–4 cm. long: fr. bluish black, oblong, 6–8 mm. long. Fl.vi; fr.vii–viii. S.O.3:t.153(c). Gr.G.2:t.165. B.B.2:404. E.N.III.5:406d-g. S.H.2:f.183a-e. (*B. volubilis* DC.) Va. to Fla., Mo. and Tex. Intr. 1714. Zone VI or VII.

2. B. racemòsa Sieb. & Zucc. Lvs. ovate, 2.5–6 cm. long, glaucescent beneath: fls. greenish, in large terminal panicles 5–15 cm. long: fr. ellipsoidal, 5–6 mm. long, first red, finally black. Fl.vii–ix; fr.vii–viii of the following year. E.N.III.5:406a-c. Japan, Formosa. Intr. 1880. Zone (V).

A related species is **B. hypochrỳsa** Schneid. Glabrous: lvs. oblong-ovate or elliptic-oblong, 5–10 cm. long; panicles 5–10 cm. long, pyramidal, its lower brs. to 3.5 cm. long. W. China. Intr. 1904? Zone VII?

4. RHAMNÉLLA Miq. Deciduous trees or shrubs; winter-buds small, with several outer scales; terminal bud wanting: lvs. alternate, serrulate,

penninerved; stipules subulate: fls. perfect, small, green, in axillary cymes, 5-merous; stamens perigynous; ovary incompletely 2-celled, about ⅓ inferior; style 2-lobed: drupe oblong, black, with a 1-seeded bony nutlet. (Diminutive of Rhamnus.) Six species in E. Asia.

R. franguloìdes Weberb. Small tree to 10 m.: lvs. ovate-oblong, 5–12 cm. long, long-acuminate, rounded at base or broad-cuneate, finely serrulate, glabrous except pubescent on the veins beneath; petioles 3–8 mm. long: fls. in short-peduncled 5–15-fld. clusters; pedicels in fr. 2–4 mm. long; fr. cylindric-oblong, 8 mm. long, black. Fl.v–vi; fr.ix–x. S.I.2:t.48(c). N.K.9:t.5. S.H.2:f.183h-i,186a. (*R. japonica* Miq., *Microrhamnus f.* Maxim.) Japan, Korea, E. China. Cult. 1906. Zone VI?—Of little ornamental value; very similar in foliage to *R. crenata*, but base of stipules persistent and fr. narrow-oblong.

5. **SAGERÈTIA** Brongn. Deciduous or evergreen shrubs, often scandent, usually with spinescent brts.; winter-buds small, with several outer scales; terminal bud wanting: lvs. opposite or subopposite, small, penninerved, entire or serrulate, of firm texture; stipules small, deciduous: fls. perfect, 5-merous, whitish, small, sessile or subsessile, rarely pediceled, forming terminal and axillary spikes often panicled; petals hooded; disk cup-shaped, 5-lobed: ovary 2–3-celled, with short 2–3-lobed style: fr. a small subglobose drupe, with fleshy to leathery exocarp and 2–3 indehiscent nutlets with leathery walls. (Named after Auguste Sageret, French botanist; 1763–1851.) About 15 species in E. and S. Asia and in N. Am.

S. pycnophýlla Schneid. Spiny scandent shrub to 2 m.; brts. tomentulose: lvs. elliptic to elliptic-obovate, 5–18 mm. long, or the smaller ones suborbicular, rounded or obtuse at ends, sharply or crenate-serrulate, yellowish green and lustrous beneath and finely reticulate; petioles 1–2 mm. long, pubescent: fls. sessile, glabrous, in spikes 1–3.5 cm. long and usually 1–4 at end of brts. Fl.vi–vii; fr.x. W. China. Intr. 1910. Zone V.—Of little or no ornamental value.

A closely related species is **S. theèzans** Brongn. Lvs. persistent or subpersistent, ovate or broad-elliptic, 8–25 mm. long, obtusish, rounded or subcordate at base: fls. pubescent, in villous usually paniculate spikes: fr. purplish black, subglobose, 5 mm. across. Fl.ix–x; fr.iv–v. N.K.9:t.15. E.N.III.5:409. C. and E. China. Intr. 1908. Zone VII or VIII?—May be useful as a hedge-plant south: fls. very fragrant.—**S. minutiflòra** Trel., a native of the S. E. States (Gr.G.2:t.166) is probably not hardy within our area.

6. **RHAMNUS** L. Buckthorn. Deciduous or sometimes evergreen trees or shrubs, often spiny; winter-buds scaly or naked; terminal bud present or wanting: lvs. alternate or opposite, penninerved, serrulate to entire, stipulate: fls. perfect, polygamous or dioecious, small, greenish, yellowish or whitish, 4–5-merous, sometimes apetalous, in axillary clusters, umbels or racemes: ovary 2–4-celled; style usually undivided: fr. a subglobose drupe with 2–4 1-seeded nutlets usually dehiscent on the inner side. (Ancient Greek name.) About 100 species chiefly native to the temp. regions of the n. hemisphere; few in Brazil and S. Africa.

A. Winter-buds scaly.
  B. Lvs. opposite or subopposite.
    C. Petioles 5–25 mm. long: lvs. with 2–8 pairs of ascending curving veins: brts. usually spinescent.
      D. Lvs. large, 3–10 cm. long.
        E. Lvs. sharply serrulate with acuminate or aristate teeth, rounded or subcordate at base: fr. on pedicels 12–25 mm. long. . . . . 1. *R. argutus*

EE. Lvs. with short acute or obtuse teeth: fr. on pedicels 3–8 mm. long.
F. Petioles ¼ to ½ as long as blade.
G. Lvs. broad-ovate to oblong.
H. Lvs. broad-ovate to elliptic, 4–7 cm. long, thin, light green beneath. 2. *R. cathartica*
HH. Lvs. narrow-elliptic to oblong, 6–10 cm. long, firm, lustrous above, grayish green beneath. 3. *R. davurica*
GG. Lvs. obovate to oblong-obovate, narrow-cuneate. 4. *R. japonica*
FF. Petioles ⅛ to 1/10 as long as blade, 5–12 mm. long: lvs. elliptic-oblong to oblong, with 5–8 pairs of veins. 5. *R. utilis*
DD. Lvs. small, 1–3, rarely to 4 or occasionally to 5 cm. long.
E. Lvs. closely crenate-serrulate, usually elliptic-obovate. 6. *R. saxatilis*
EE. Lvs. remotely and obscurely crenate-serrulate, those of shoots often rhombic-lanceolate or obovate-lanceolate.
F. Young brts. and lvs. more or less pubescent. 7. *R. dumetorum*
FF. Young brts. and lvs. glabrous or nearly so. 8. *R. Rosthornii*
CC. Petioles 2–4 mm. long: lvs. with numerous parallel straight veins, 6–12 cm. long. 11. *R. costatus*
BB. Lvs. alternate.
C. Brts. spinescent: lvs. narrow with few ascending veins. 9. *R. spathulaefolia*
CC. Brts. not spinescent.
D. Lvs. deciduous.
E. Stipules persistent: lvs. small: fls. 5-merous. 10. *R. heterophylla*
EE. Stipules not persistent: lvs. large: fls. 4-merous (except No. 17): lvs. large.
F. Lvs. with 12–25 pairs of parallel, nearly straight veins.
G. Lvs. pubescent. 12. *R. imeretina*
GG. Lvs. glabrous. 13. *R. fallax*
FF. Lvs. with 4–12, rarely to 14 pairs of veins.
G. Petioles 6–15 mm. long (see also No. 1).
H. Lvs. subcordate or rounded at base, with 8–12 pairs of veins. 14. *R. alpina*
HH. Lvs. cuneate, with 6–8 pairs of veins. 15. *R. pumila*
GG. Petioles 3–8 mm. long.
H. Lvs. elliptic to oblong-lanceolate, serrulate: fls. 4-merous. 16. *R. lanceolata*
HH. Lvs. elliptic, crenate-serrate: fls. 5-merous: low shrub. 17. *R. alnifolia*
DD. Lvs. evergreen or half-evergreen, remotely spinulose-denticulate (or crenate-serrate in the hybrid). 18. *R. Alaternus*
AA. Winter-buds naked.
B. Lvs. evergreen: infl. peduncled. 19. *R. californica*
BB. Lvs. deciduous.
C. Fls. in peduncled umbel-like cymes.
D. Lvs. with 7–15 pairs of veins, 5–15 cm. long.
E. Lvs. acute to short-acuminate, sometimes obtuse, often nearly entire.
F. Peduncles usually longer than petiole: lvs. with 8–15 pairs of veins. 20. *R. Purshiana*
FF. Peduncles usually shorter than petiole: lvs. with 8–10 pairs of veins. 21. *R. caroliniana*
EE. Lvs. distinctly acuminate, closely serrulate. 22. *R. crenata*
DD. Lvs. with 6–8 pairs of veins, 2–5 cm. long, glabrous: low shrub. 23. *R. rupestris*
CC. Fls. fascicled, sometimes solitary: lvs. with 8 or 9 pairs of veins, usually entire, 3–7 cm. long. 24. *R. Frangula*

Subgen. I. EURHAMNUS Dipp. Winter-buds scaly, terminal bud wanting: lvs. often opposite: fls. polygamo-dioecious, usually 4-merous; style 2–4-parted; seed (not the outer coat of nutlet) with dorsal furrow; cotyledons thin, curved, green.

Sect. 1. CERVISPINA Moench. Brts. usually spinescent and often spur-like with fascicled lvs.

1. **R. argùta** Maxim. Shrub to 3 m., with slender, rarely spinescent brts.: lvs. sometimes alternate, roundish-oval to ovate, 2.5–7 cm. long, obtuse or acutish, rounded or subcordate at base, sharply and finely serrulate, with acuminate or aristate teeth, bright green, lighter beneath, glabrous; petiole 1–2.5 cm. long: pubescent above: fls. slender-pediceled, often in clusters on spurs: fr. subglobose-pyriform, 6–8 mm. long, on pedicels 1.2–2.5 cm. long. Fl.IV–V; fr.IX. Mém. Acad. Sci. St. Pétersb.VII.10,No.11:t. S.H.2:f.197l-n, 199h-h[1]. N. China. Intr.? Zone V.—Usually unarmed shrub with bright green lvs.; very distinct on account of the peculiar serration and the long-stalked fr.

2. **R. cathártica** L. COMMON B. Shrub or small tree to 6 m.: lvs. elliptic or ovate, 4–7 cm. long, acute or obtusish, rounded or subcordate at base,

sometimes broad-cuneate, crenate-serrulate, dull green above, light green and usually glabrous beneath, with 3–5 pairs of veins, thin; petiole 6–25 mm. long: fls. yellowish green, in 2–5-fld. clusters: fr. black, subglobose, about 6 mm. across; seed with the furrow open only near base. Fl.v–vi; fr.ix–x. F.D.21:t.2183(c). S.E.2:t.318(c). M.Am.1:t.41(c). B.B.2:502. M.A.t.68(h). (Hart's Thorn, Waythorn, Rhineberry.) Eu., W. and N. Asia; naturalized in the E. States. Cult. since centuries. Zone I.—Var. **pubéscens** Bean. Lvs. pubescent beneath.—Used as a hedge-plant.

3. **R. davùrica** Pall. Large spreading shrub or small tree to 10 m., with rather stout often spinescent brts., glabrous: lvs. elliptic-obovate to oblong, 4–10 cm. long, acuminate, cuneate, crenate-serrulate, lustrous above, grayish green and glabrous or slightly pubescent beneath, of firm texture: petiole 6–25 mm. long: fls. and fr. like those of preceding sp.; seed usually with narrow furrow. Fl.v–vi; fr.ix–x. G.F.9:425 (as *R. crenata*). N.K.9:t.12. B.C.5:2925. (*R. cathartica* var. *d.* Maxim.) Dahuria to N. China, Manch. and Korea. Intr. 1817. Zone I.—Var. **nippónica** Mak. Lvs. narrow-oblong, 5–15 cm. long, 2.5–5 cm. broad, light green beneath. N.K.9:t.13. S.H.2:f. 197q(l). Japan, Korea. Intr. before 1892. Zone V.—Similar to the preceding, but of more vigorous spreading habit and with larger lustrous lvs.

A related species is **R. chloróphora** Dipp., not Decne. Lvs. elliptic to obovate, 3–8 cm. long, crenate-serrulate, with 4–5 pairs of veins; petiole 6–15 mm. long: style long, with usually 3 stigmas: seed furrowed. S.H.2:f.197r-s,199r-u. Orig. unknown. Cult. 1890.

4. **R. japónica** Maxim. Shrub to 3 m.; brts. yellowish or grayish brown, lustrous, often spinescent or spur-like: lvs. obovate to oblong-obovate, 5–8 cm. long, rounded and short-acuminate, cuneate, serrulate, with 3–5 pairs of veins, slightly pubescent beneath or nearly glabrous, bright green; petiole 8–25 mm. long, pubescent: fls. greenish brown, usually in dense clusters on spurs: fr. black, 6–8 mm. across: seeds with usually closed furrow. Fl.v; fr.x. S.I.2:t.48(c). S.H.2:f.196t-u,197e-k. Japan. Intr. 1888. Zone V.—Shrub with bright green lvs. and slightly fragrant fls.

Related species are: **R. virgàta** Roxb. Shrub or small tree; young brts. pubescent: lvs. narrow-elliptic to lanceolate, 4–8 cm. long, usually obtusely acuminate, slightly pubescent on both sides, denticulate or erose-denticulate; petiole 4–10 mm. long: fr. bluish black; seed with open furrow. S.H.2:f.192f-h(l). N. W. Himal. Cult. 1919. Zone VII?—**R. leptophýlla** Schneid. Shrub to 2 m.: lvs. elliptic-obovate, 4–7 cm. long, acuminate, remotely denticulate, glabrous beneath, bright green: pedicels and receptacle pubescent outside: seed with an open furrow. S.H.2:f.196v-w,198e-h. C. and W. China. Intr. 1907. Zone V.

5. **R. ùtilis** Decne. Shrub to 3 m.; brts. usually not spinescent, glabrous: lvs. narrow-elliptic to oblong, 6–12 cm. long, short-acuminate to acuminate, cuneate, serrulate, yellow-green, glabrous and yellowish green beneath, with 5–8 pairs of yellow veins, sometimes with yellowish pubescence on veins when young; petiole 5–12 mm. long: fls. yellowish green: fr. black, 6–7 mm. across, usually 2-seeded; seed furrowed. Fl.iv–v; fr.ix–x. Rondot, Vert de Chine,t.1. S.H.2:f.197t-w,199l. C. and E. China. Cult. 1870. Zone V or VI. —Shrub with slender brs. and handsome bright or yellow-green lvs.

6. **R. saxàtilis** Jacq. Rock B. Low spreading shrub to 60 or 90 cm.; young brts. minutely pubescent, becoming mostly spiny: lvs. elliptic-ovate to obovate, 1–2.5 cm. long, often folded, acute or obtusish, cuneate, serrulate, glabrous, with 2–4 pairs of veins: fls. very small, greenish yellow: fr. turbinate, black; seeds usually 3, with open furrow. Fl.v–vi; fr.viii–ix. F.D.21:t. 2186(c). S.O.3:t.t.159(c). H.W.3:57. S.H.2:f.193o-o^4,196a-e. C. and S. Eu. Intr. 1752. Zone V.

Related species are: **R. infectòria** L. Avignon Berry. Spreading shrub to 2 m., spiny: lvs. elliptic or sometimes obovate or ovate, 1–4 cm. long, acute, dark green, usually glabrous above and slightly pubescent beneath; petiole 4–10 mm. long: seeds usually 2, with only partly open furrow. G.O.t.98(c, as *R. saxatilis*). F.D.21:t.2185(c). E.N.III.5:f.201b. S.H.2:f.195a-a^3,196f-h^1. (*R. saxatilis* ssp. *i.* Rouy & Fouc.) S. Eu. Intr. 1683. Zone VI.—**R. tinctòria** Waldst. & Kit. Shrub to 1.5 m.; young brts. pubescent: lvs. elliptic or narrow-elliptic, 2–5 cm. long, pubescent beneath and usually above; petiole 4–10 mm. long: seed with open furrow. F.D.21:t.2184(c). G.O.t.97(c). S.H.2:f.195b-b(l). S. E. Eu. Intr. 1820. Zone V.—**R. prunifòlia** Sibth. & Sm. Spreading, procumbent or upright shrub: lvs. oval or obovate, 8–18 mm. long, obtuse, cuneate, finely denticulate, glabrous or nearly so; petiole 1–3 mm. long: seed with open furrow. S.H.2:f.193m-n^1(not l-l^1). S.L.331(h). S. E. Eu. Intr. before 1858. Zone VII?

7. **R. dumetòrum** Schneid. Spreading shrub to 2 m., with numerous short spiny brts., minutely pubescent when young, later usually red-brown: lvs. elliptic or obovate, 8–20 mm. long, those of shoots elliptic-lanceolate to obovate-oblong, 1.5–3.5 cm. long, acute or obtuse, cuneate, crenate-denticulate, slightly pubescent above, pubescent on the veins beneath, with 3–4 pairs of veins; petiole 3–6 mm. long, pubescent: fls. green, sparingly pubescent, apetalous: fr. globose-obovoid, about 6 mm. across, on very short pedicels: seed with furrow open only at base. Fl.v–vi; fr.x. W. China. Intr. 1910. Zone V.—Var. **crenoserràta** Rehd. & Wils. Lvs. 4–7 cm. long, crenate-serrate, usually with 5 pairs of veins: pedicels of fr. about 5 mm. long. W. China. Intr. 1910. Zone V.

A related species is **R. globòsa** Bge. Spiny shrub; brts. pubescent, rather slender: lvs. usually obovate, sometimes nearly suborbicular, 1.5–4 cm. long, abruptly and obtusely short-acuminate, crenate-serrulate, pubescent on both sides; petiole 3–10 mm. long: fr. short-stalked, usually 2-seeded; seed with furrow open only at base. Rondot, Vert de Chine,t.2. S.H.2:f.195f-f^3,196q-r. (*R. chlorophora* Decne., *R. virgata* var. *aprica* Maxim.) N. China. Cult. ?

8. **R. Rosthórnii** Pritzel. Shrub to 2 m.; young brts. glabrous or slightly pubescent: lvs. obovate to obovate-oblong or lance-oblong, obtusely acuminate or obtusish, gradually narrowed at base, 1.2–4 cm. long, remotely crenate-denticulate, with usually 3 pairs of veins, glabrous; petiole 2–5 mm. long, finely pubescent: fr. globose-ovoid, 5 mm. across, on a stalk 2–4 mm. long, seeds usually 2, with partly open furrow. Fl.v–vi; fr.ix. S.H.2:f.195g-g^2,196i. W. China. Intr. 1908. Zone V or VI.

A related species is **R. parvifòlia** Bge. Spiny shrub, to 2 m.: lvs. elliptic-obovate to elliptic, 1.5–3.5 cm. long, acute, cuneate, dark green and often pilose above, grayish green and glabrous or with axillary tufts of hairs beneath, with 3–5 pairs of veins; petiole 5–16 mm. long: fr. subglobose, on a stalk 5–10 mm. long; seed with open or sometimes closed furrow. N.K.9:t.11. S.H.2:f.192i-l,196x-y^1. (*R. polymorphus* Turcz., *R. virgata* var. *sylvestris* Maxim.) N. E. Asia. Intr. 1910. Zone V.—See also *R. Schneideri* under No. 9.

9. **R. spathulaefòlia** Fisch. & Mey. Shrub to 2 m.; brts. finely pubescent when young, often becoming spinescent: lvs. elliptic-lanceolate to lanceolate or oblanceolate, 1.5–5 cm. long, acute or obtusish, rarely short-acuminate, gradually narrowed at base, denticulate or remotely crenate-serrulate, pubescent on both sides when young, later glabrescent: petiole 2–10 mm. long: fr. black, on a stalk 4–10 mm. long; nutlet dehiscent; seed with the furrow open only at ends, at apex divided by an inflexed appendix. Fl.v–vi; fr. viii–ix. S.H.2:f.193a-a^3,194g. (*R. Pallasii* var. *s.* Maxim.) W. Asia. Cult. 1870. Zone V.

Related species are: **R. Pallàsii** Fisch. & Mey. Spreading spiny shrub: lvs. linear to linear-lanceolate, 1.5–3.5 cm. long, serrulate, slightly pubescent when young; petiole 3–6 mm. long: fr. usually with 2 dehiscent nutlets; seed with open furrow, without appendix at apex. Pallas, Fl. Ross.2:t.14. S.H.2:f.193c-c^2,194 b-e^1. S.L.331(h). W. Asia. Cult. 1890. Zone V.—**R. erythróxylon** Pall. Spreading spiny shrub; young brts. finely pubescent: lvs. linear to linear-lanceolate,

2–5 cm. long, acute, serrulate, slightly pubescent when young; petiole 5–12 mm. long: fr. with 3 indehiscent nutlets; seed with narrow furrow. Pallas, Fl. Ross. 2:t.13(c). L.A.2:535. S.H.2:f.193b,194f. Siberia. Intr. 1823. Zone V.—**R. Schneideri** Lév. Spreading usually spiny shrub: lvs. sometimes subopposite, elliptic to elliptic-obovate, 2.5–5.5 cm. long, obtusely short-acuminate, crenate-serrulate, bright green and glabrous: fls. slender-pediceled: fr. broad-obovoid, on a pedicel 7–18 mm. long; seed with furrow open at base only. N.K.9:t.6a. S.H.2:f. 198r-u. Korea. Not intr.—Var. **manshùrica** Nakai. Young brts. pubescent: lvs. pilose above and on the veins beneath. N.K.9:t.6b. Korea, Manch. Intr. 1917. Zone V.

Sect. 2. Espinosa K. Koch. Brts. not spinescent: lvs. alternate (except No. 11).

10. **R. heterophýlla** Oliv. Shrub to 1.5 m., with slender alternate brs.; young brts. densely short-pilose, with persistent, somewhat spinescent stipules: lvs. ovate or sometimes suborbicular to oblong-lanceolate, 5–30 mm. long, acute or acuminate, cuneate to rounded at base, remotely and finely crenate-serrulate, glabrous above, villous on midrib beneath and yellowish green, firm, with 3–4 pairs of veins; petiole 1–2 mm. long: fls. minute, 1 or 2 in the axils, very short-stalked, 5-merous, pubescent outside: fr. subglobose, about 5 mm. across, black, 3-seeded, on stalks about 1 mm. long. Fl.vii; fr.x. H.I.18:1759. W. China. Intr. 1910. Zone VI?—A very distinct species with small lvs. of different shapes on the same br.

11. **R. costàta** Maxim. Shrub to 5 m.; brts. stout, glabrous: lvs. opposite, short-petioled, ovate-oblong, 8–14 cm. long, short-acuminate, broad-cuneate or narrowed to a subcordate base, crenate-serrulate, rugose above, pubescent beneath chiefly on the veins, with about 20 pairs of veins; petiole 2–4 mm. long: fls. yellowish green, on slender stalks 1.5–3 cm. long: fr. obovoid, about 8 mm. across, 2-seeded; seeds with closed furrow. Fl.vi; fr.x. S.I.2:t.48(c). S.H.2:f.191m(l). M.G.31:29(h),30. S.L.330(h). Japan. Cult. 1908. Zone VI?—Very distinct and handsome species.

A similar species is **R. Sargentiàna** Schneid. Shrub to 6 m.; lvs. alternate, elliptic-oblong, 4–12 cm. long, sparingly hairy beneath, with 12–18 pairs of veins; petiole 2–5 mm. long: pedicels 2–3 mm. long; fr. about 5 mm. across, 3-seeded. W. China. Intr. 1908. Zone VI?

12. **R. imeretìna** Booth. Shrub to 3 m., with stout brts. slightly pubescent when young: lvs. elliptic-oblong to oblong, 10–25 cm. long, acuminate, rounded or subcordate, serrulate, dark green and glabrescent above, pubescent beneath chiefly on the veins, with 15–25 pairs of veins impressed above; petiole 1–2 cm. long: fls. green, small, in few-fld. clusters: fr. about 6 mm. across. Fl.vi; fr.x. B.M.6721(c). S.H.2:f.190n-n³,191f-g. M.G.21:405(h). (*R. libanotica* Hook. f., not Boiss., *R. alpina* var. *colchica* Kusnetz., *R. colchica* Somm., *R. grandifolia* Hort., not Fisch. & Mey., *R. castaneifolia* Hort.) Cauc., W. Asia. Intr. before 1858. Zone V.—Handsome shrub with large lvs. changing to bronzy purple in autumn.

A related species is **R. libanótica** Boiss. Lvs. smaller, oblong-obovate, 6–12 cm. long, crenate-denticulate, pubescent beneath, with 10–15 pairs of veins; petiole 6–10 mm. long: fr. about 5 mm. across. S.H.2:f.189s,190n-n³. Syria, Cilicia. Cult. 1905. Zone VI?—See also *R. Sargentiana* under No. 11.

13. **R. fállax** Boiss. Carniolian B. Shrub to 3 m.; brts. rather stout, glabrous, becoming reddish brown: lvs. elliptic-oblong to oblong or oblong-obovate, 5–12 cm. long, acuminate, rounded or subcordate at base, crenate-serrulate, dark green above, lighter green and glabrous or nearly so beneath, with 12–20 pairs of veins; petiole 6–15 mm. long: fls. yellowish green, in 3–7-fld. clusters; pedicels 3–6 mm. long: fr. subglobose, 5–6 mm. across. Fl.v–vi; fr.vii–ix. S.O.3:t.157(c, as *R. alpinus*). H.W.3:58. H.M.5:341(h). (*R. carniolicus* Kern., *R. alpina* var. *grandifolia* Hort.) Mts. of S. E. Eu. Cult. 1800. Zone V.

14. **R. alpìna** L. Alpine B. Shrub to 3 m.; young brts. glabrous or finely pubescent, becoming dull grayish brown: lvs. elliptic, 5–10 cm. long, rounded or abruptly short-acuminate, rounded to subcordate at base, serrulate, glabrous, with 9–12 pairs of veins; petiole 5–15 mm. long: fls. and fr. like the preceding species, but fr. smaller. Fl.v–vi; fr.viii–ix. L.B.1077(c). F.D.21: t.2187(c). S.H.2:f.189i-l,190f-h. S. W. Eu. Intr. 1752. Zone V.

A related species is **R. purpúrea** Edgew. Tall shrub or small tree; brts. glabrous: lvs. elliptic to elliptic-oblong, 7–16 cm. long, acuminate, broad-cuneate, crenate-serrulate, glabrous, with 7–10 pairs of veins; petiole 5–10 mm. long: fls. 5-merous: fr. subglobose, on pedicels of about equal length. M.G.1916:31. Brandis, For. Fl.t.18. Cult. 1916. N. W. Himal. Zone VII?

15. **R. pùmila** L. Dwarf B. Low, often procumbent shrub; young brts. finely pubescent: lvs. suborbicular to elliptic, 2–5 cm. long, acute or acutish, broad-cuneate, crenate-serrulate, glabrous or slightly pubescent on veins beneath, with 5–8 pairs of veins; petiole 3–10 mm. long: fls. yellowish green, on pedicels 4–7 mm. long: fr. bluish black, subglobose. Fl.v–vii; fr.viii–ix. S.H.2:f.189e-h,190o-p. Alps. Intr. 1752. Zone V.—Adapted for rockeries.

16. **R. lanceolàta** Pursh. Upright slender-branched shrub to 2 m.; brts. puberulous, becoming reddish brown: lvs. ovate-lanceolate to oblong-lanceolate, 2.5–8 cm. long, acute or acuminate, often obtuse on flowering brts., cuneate or rounded at base, finely serrulate, glabrous or minutely downy and light green beneath, with 7–9 pairs of veins; petiole 5–10 mm. long: fls. perfect, of 2 forms on distinct plants, one with short clustered pedicels and short style and one with fewer often solitary pedicels and exserted style: fr. subglobose, about 6 mm. across, 2-seeded. Fl.v; fr.viii–ix. Gr.G.2:t.168. B.B.2: 503. S.H.2:f.190q-s,192a-c. Pa. to Neb., Iowa, Tex. and Ala. Cult. 1870. Zone VI?—Handsome shrub with bright green lvs.

A closely related species is **R. Smíthii** Greene. Shrub to 5 m.; brts. glabrous, becoming light grayish brown: lvs. oblong-lanceolate to lanceolate, 3–7 cm. long, obtuse or rarely acutish, usually rounded or nearly rounded at base, crenate-serrulate, glabrous, yellowish green beneath, firm and thickish. Colo. Intr. 1905. Zone V.

17. **R. alnifòlia** L'Hérit. Low spreading shrub, rarely exceeding 1 m.; young brts. minutely downy: lvs. elliptic to ovate, 4–10 cm. long, acute, cuneate, unequally crenate-serrate, glabrous or slightly pubescent on the veins beneath, with 6–8 pairs of veins; petiole 5–12 mm. long: fls. usually 2–3, apetalous, 5-merous: fr. subglobose, 6 mm. across, black, 3-seeded. Fl. v–vi; fr.ix–x. G.O.t.61(c). B.B.2:503. Hooker, Fl. Bor. Am.1:t.42. S.H.2: f.190t-w,192d-e. S.L.330(h). N. B. and N. J. to B. C. and Calif. Intr. 1778. Zone I.—Low rather compact shrub with handsome bright green foliage.

18. **R. Alatérnus** L. Evergreen shrub to 4 or 6 m.; brts. minutely downy: lvs. elliptic or ovate to ovate-lanceolate, 2–5 cm. long, acute, remotely serrate or nearly entire, dark green and lustrous above, yellowish green and glabrous or nearly so beneath, with 3–5 pairs of veins; petiole 4–6 mm. long: fls. yellowish green, very small, 5-merous, polygamo-dioecious in short fascicle-like racemes: fr. black, 6 mm. across. Fl.iii–iv; fr.vii–ix. N.D.3:t.14(c). H.W. 3:59. S.H.2:f.187a-f,188g-m. Mediterr. region. Intr. about 1700. Zone VII or VIII.—Var. **argénteo-variegàta** Rehd. Lvs. rather narrow, with broad creamy-white margin. S.O.3:t.156, upper fig.(c). (var. *variegata* Bean.)—Var. **angustifòlia** Willd. Lvs. oblong-lanceolate to lanceolate, more deeply toothed. (*R. a.* Mill., *R. Perrieri* Hort.)—Var. **intergrifòlia** Bean. Lvs. mostly without teeth, rather conspicuously veined.—Handsome evergreen shrub of bushy habit.

R. A. × *alpina* = **R. hýbrida** L'Hérit. Half-evergreen shrub to 4 m.: lvs.

elliptic or ovate to elliptic-oblong, 4–10 cm. long, obtuse or acutish, shallowly serrulate, lustrous above, glabrous, with about 7 pairs of veins; petiole 4–8 mm. long. S.H.2:f.189a-c. G.W.12:342(h, as *R. latifolia viridis*)? Orig. before 1788. Zone VI or VII.—Var. **Billiardi** Lav. Lvs. smaller, narrower, more lanceolate and more coarsely denticulate. S.H.2:f.189d.

Subgen. II. FRANGULA Dipp. Unarmed shrubs; winter-buds naked: lvs. always alternate: fls. perfect, 5-merous, in sessile or peduncled umbel-like cymes, rarely solitary; styles simple with 3-lobed stigma: seed not furrowed; cotyledons flat, thick, hypogeous. (*Frangula* Mill.)

19. **R. californica** Eschsch. COFFEE-BERRY. Evergreen shrub to 5 m.; young brts. pubescent: lvs. oblong to oblong-lanceolate, 3–10 cm. long, obtuse or acute, to short-acuminate, usually rounded at base, serrulate or entire, yellowish green and glabrous beneath or pubescent on the veins, with 8–12 pairs of veins; petiole 4–15 mm. long: peduncles longer or shorter than petiole, pubescent: fr. depressed-globose, 8 mm. across, changing from red to purple-black. Fl.v–vii; fr.viii–ix. Hooker, Fl. Bor. Am.1:t.44. R.H.1874:354. S.H.2:f.186c-f(l). (*R. oleifolia* Hook., *R. Purshiana* var. *c.* Rehd., *Frangula c.* Gray.) Ore. to Calif. Cult. 1871, or possibly 1858? Zone VII or VIII.

A closely related species is **R. tomentélla** Benth. Brts. and lvs. beneath densely yellowish or grayish tomentose. S.S.2:t.63,f.2. R.H.1858:658;1872:194. (*R. californica* var. *t.* Brew. & Wats., *R. Purshiana* var. *t.* Brandegee, *R. ursina* Greene.) Calif. to Ariz. Cult. 1858.

20. **R. Purshiàna** DC. CASCARA SAGRADA. Tall shrub or tree to 15 m.; young brts. pubescent or tomentose: lvs. elliptic to ovate-oblong, 5–15 cm. long, acute or obtuse, rounded at base, remotely denticulate or sometimes entire, dark green above, lighter and pubescent beneath or nearly glabrous, with 10 to 15 pairs of veins; petiole 1–2 cm. long: infl. pubescent: fr. turbinate, 8 mm. long, purplish black with 2–3 seeds. Fl.v–vi; fr.ix. S.S.2:t.62,63. Am. For.29:177(h). Kew Bull.1908:430,t(h). B. C. to Mont. and N. Calif. Cult.1870. Zone VI.—Handsome small tree; it is the source of the drug "Cascara Sagrada."

21. **R. rupéstris** Scop. Spreading shrub to 80 cm., sometimes procumbent; young brts. pubescent: lvs. elliptic to elliptic-oblong or sometimes broad-oval to nearly orbicular, 2–5 cm. long, obtuse or acute, rounded at base, denticulate or sometimes entire, pubescent on the veins beneath, with 5–8 pairs of veins; petiole 2–5 mm. long: fls. in pubescent 3–8-fld. umbels: fr. globose-obovoid, 6 mm. across, first red then black. Fl.v–vi; fr.vii–ix. F.D.21:t.2188(c). S.O.3:t.155(c). S.H.2:f.185e-e³,186m-o. (*Frangula r.* Schur.) S. E. Eu. Cult. 1800. Zone V or VI.

22. **R. Frângula** L. ALDER B. Shrub or small tree to 6 m.; young brts. pubescent: lvs. oval or obovate to obovate-oblong, 3–7 cm. long, acute, rounded or broad-cuneate at base, entire, dark lustrous green above, lighter green and often slightly pubescent beneath, with 8 or 9 pairs of veins; petiole 6–12 cm. long: fls. in clusters of 2–10, glabrous; pedicels 8–12 mm. long: fr. globose, 6 mm. across, changing from red to dark purple, 2-seeded. Fl.v–vii; fr.vii–ix. S.E.2:t.319(c). F.D.21:t.2189(c). H.W.3:t.48(c). B.B.2:504. Gg.8:3. (*Frangula Alnus* Mill., *Frangula F.* Karst.) Eu., W. Asia, N. Afr.; naturalized in the E. States, also in Ill. Long cult. Zone I.—Var. **latifòlia** Dipp. Lvs. larger and broader, to 12 cm. long and to 6 cm. broad: fr. larger. S.H.2:f.186k(l). (*R. l.* Kirchn., not L'Hérit.) Caucas. Cult. 1860.—Var. **angustifòlia** Loud. Lvs. lance-oblong or lanceolate, 6–25 mm. wide, with uneven or erose margin. (Var. *heterophylla* Mouillef.)—Var. **aspleniifòlia** Dipp. Lvs. linear to linear-lanceolate, 4–6 cm. long and 3–5 mm. wide, with wavy margin. Növen. Közlem.6:57. Cult. 1888.—Handsome shrub with lustrous

lvs. changing to clear yellow in autumn and with numerous red to purple-black fr. in late summer.

A related species is **R. latifòlia** L'Hérit. Small tree: lvs. elliptic to elliptic-oblong, 10–18 cm. long, entire, with 10–13 pairs of veins, pubescent beneath; receptacle pubescent on both sides. B.M.2663(c). G.O.t.100(c). I.T.3:t.106. Azores. Intr. 1778. Zone VIII?

23. **R. caroliniàna** Walt. Indian Cherry. Shrub or small tree, to 10 m.; young brts. puberulous: lvs. elliptic to oblong or lance-oblong, 5–15 cm. long, acute or acuminate, usually rounded at base, obscurely serrulate or nearly entire, with 8–10 pairs of veins; petiole 6–16 mm. long, pubescent: infl. pubescent, 2–8-fld.: fr. globose, 8 mm. across, changing from red to black, sweet; nutlets 3. Fl.v–vi; fr.ix. S.S.2:t.61. B.B.2:503. Gr.G.2:t.167. (*Frangula c.* Gray.) N. Y. to Fla., w. to Neb. and Tex. Intr. 1819. Zone (V).—Shrub with handsome lvs. changing to yellow in autumn.

24. **R. crenàta** Sieb. & Zucc. Shrub to 3 m.; young brts. and young lvs. rusty-pubescent, soon glabrous: lvs. oblong-ovate to lance-oblong or obovate-oblong, 5–10 cm. long, acuminate or long-acuminate, rounded at base, serrulate, bright green above, lighter green beneath and pubescent at least on the veins, with 7–12 pairs of veins; petiole 8–15 mm. long: infl. pubescent, on a peduncle to 1 cm. long, sometimes sessile: fr.subglobose, 6–8 mm. across, changing from red to black. Fl.vi; fr.viii–ix. S.I.2:t.47(c). N.K.9:t.14. S.H.2:f.185f-g[1],186p-q. (*Frangula c.* Miq.) Japan and Korea to C. China. Intr. 1905. Zone V.

7. **HOVÈNIA** Thunb. Deciduous tree; winter-buds with 2 outer caducous scales, pubescent; lvs. alternate, long-petioled, 3-nerved at base, estipulate: fls. perfect, 5-merous, small, greenish, in axillary and terminal cymes; petals convolute, enclosing the stamens; disk pubescent; style 3-parted: fr. 3-celled and 3-seeded, with leathery exocarp, indehiscent; the brs. of the infl. fleshy and twisted at maturity; seed flattened, with lustrous dark brown testa; cotyledons flat, broad. (After David Hoven, senator of Amsterdam.) One species.

H. dúlcis Thunb. Japanese Raisin-tree. Tree to 10 m.: lvs. broad-ovate to elliptic, 10–15 cm. long, acuminate, subcordate or rounded and usually unequal at base, coarsely serrate, glabrous or pubescent on the veins beneath; petiole 3–5 cm. long: fls. 7 mm. across, in many-fld. cymes 4–6 cm. broad on peduncles 1.5–3 cm. long: fr. subglobose, about 8 mm. across, light grayish or brownish; the fleshy brs. of the infl. reddish. Fl.vi–viii; fr.ix–x. S.Z.1: t.73,74(c). B.M.2360(c). B.R.501(c). S.I.2:t.47(c). S.H.2:291. (*H. acerba* Lindl., *H. inaequalis* DC.) China; cult. in Japan and India. Cult. 1820. Zone (V).—Ornamental tree grown for its handsome foliage and possibly also for the fleshy edible infl.

8. **CEANÒTHUS** L. Deciduous or evergreen shrubs, rarely small trees, sometimes spiny; winter-buds small, pubescent, with few outer scales: lvs. alternate, sometimes opposite, serrate or entire, usually 3-nerved at base; stipules small, deciduous; fls. perfect, small, 5-merous, in small umbels forming spikes or panicles; sepals often incurved, colored; petals hooded and clawed, spreading or recurved; filaments slender; disk annular; ovary 3-celled, partly or sometimes scarcely adnate to receptacle: fr. usually globose-turbinate, 3-lobed at apex, dry at length and separating into 3 dehiscent parts, the receptacle persisting as a cup; seeds albuminous; embryo with flat cotyledons. (Ancient Greek name.) Nearly 50 species in N. Am. chiefly in the Pacific coast region, s. to Mex.

A. Lvs. alternate, distinctly 3-nerved at base.
B. Lvs. crenate or serrate.
C. Lvs. glabrous or pubescent and green beneath.
D. Lvs. membranous, deciduous.
E. Fls. white.
F. Infl. slender-peduncled, at end of the young growth.
G. Lvs. ovate to oblong-ovate, acute or acuminate.....1. *C. americanus*
GG. Lvs. elliptic to elliptic-lanceolate, obtuse or acutish.....2. *C. ovatus*
FF. Infl. short-peduncled, lateral on brts. of the previous season.3. *C. sanguineus*
EE. Fls. blue or pink.
F. Lvs. pubescent beneath: fls. blue.....4. *C. Delilianus*
FF. Lvs. glabrous or nearly glabrous beneath: fls. pale blue, pink or pinkish.
5. *C. pallidus*
DD. Lvs. leathery, persistent, obtuse, glabrous or appressed-pubescent beneath; fls. blue, rarely white.....6. *C. thyrsiflorus*
CC. Lvs. tomentose beneath.
D. Brts. glabrous: lvs. grayish tomentulose beneath, the veins glabrescent.
7. *C. velutinus*
DD. Brts. tomentose: lvs. tawny or whitish tomentose beneath: fls. blue..8. *C. coeruleus*
BB. Lvs. entire, rarely finely serrulate, 1–2.5 cm. long: fls. white: low spinescent shrub.
9. *C. Fendleri*
AA. Lvs. opposite, penninerved, thick, small.....10. *C. cuneatus*

1. **C. americànus** L. New Jersey Tea. Shrub to 1 m., with slender upright brs.; young brts. pubescent: lvs. ovate to ovate-oblong, 3–8 cm. long, acute or acuminate, irregularly serrulate, dull green above, pubescent or nearly glabrous beneath; petiole 6–12 mm. long: fls. in terminal and axillary slender-peduncled panicles forming large corymbose panicles at end of brs.: fr. 5–6 mm. across. Fl.VI–IX; fr.IX–X. B.M.1479(c). Gr.G.2:t.169. B.C.2:696. Gn.56:137(h). Can. to Man., Neb., Tex. and S. C. Intr. 1713. Zone IV.—Var. **intermèdius** K. Koch. Lvs. ovate to lance-ovate, 1–3 cm. long; fls. in smaller, very slender-peduncled spikes: fr. smaller. S.H.2:f.201e-f(l). (*C. i.* Pursh.) Tenn. to Fla. and Ala. Intr. 1812.—Ornamental summer-blooming shrub adapted for borders of shrubberies.

C. a. × *coeruleus* = *C. Delilianus;* see No. 4.—*C. a.* × *Delilianus* = *C. pallidus;* see No. 5.

2. **C. ovàtus** Desf. Upright shrub to 60 cm.; brts. slightly pubescent and often slightly glandular: lvs. elliptic to elliptic-lanceolate, 2–6 cm. long, obtuse to acute, crenate-serrulate, lustrous above, nearly glabrous beneath; petiole 4–6 mm. long: infl. like that of the preceding, but smaller and peduncles shorter: fr. 4–5 mm. across. Fl.V–VI; fr.VII–VIII. B.B.2:505. S.H.2:201g-i. (*C. ovalis* Bigel.) N. Eng. to Neb., Colo. and Tex. Cult. 1830. Zone V.—Var. **pubéscens** Torr. & Gray. Brts. and lvs. pubescent beneath; lvs. usually smaller and narrower and with more prominent veins. (*C. p.* Rydb.) Mich. to Iowa, Neb. and Tex. Intr. 1904.

3. **C. sanguíneus** Pursh. Shrub to 4 m.; brts. purple or reddish, glabrous: lvs. orbicular or ovate to obovate, 2.5–8 cm. long, obtuse, rounded or subcordate at base, serrate, slightly pubescent beneath; petiole 1.5–2.5 cm. long: fls. white, in lateral leafless narrow panicles 4–12 cm. long on stout peduncles: fr. 4 mm. across. Fl.V–VI. B.M.5177(c). S.H.2:f.201k,202a-b. (*C. oreganus* Nutt.) B. C. to Calif. Intr. 1853 (or 1838?). Zone VI?

4.×**C. Delilìanus** Spach (*C. americanus* × *coeruleus*). Young brts. finely pubescent: lvs. elliptic-ovate or ovate to oblong-ovate, 4–8 cm. long, sometimes 10 cm., acute or short-acuminate, rarely obtuse, rounded at base, dark green and slightly pubescent above, pubescent or sometimes nearly tomentose beneath; petiole 5–10 mm. long: fls. pale to deep blue, in slender-stalked, lateral and terminal narrow panicles; rachis pubescent; pedicels glabrous, 5–8 mm. long. M.G.18:485. Gn.61:223(h);80:76(h). (*C. Arnouldii* Carr., Koehne, *C. versaillensis* Hort., *C. hybridus* Hort., partly, *C. azureus* Hort.) Orig. before 1830. Zone VI–VII.—Here belong: "Gloire de Versailles," bright

blue (Gn.85:595[hl]); "Gloire de Plantières," deep blue; "Victor Jouin," dark blue; "Ciel de Provence," deep blue (R.H.1903:332,t [c]);"Léon Simon," pale blue (Nederl. Fl. Pomon.t.72[c]).—The various forms of this and the following hybrid are valued for their showy fls. and their late blooming season.

5.×**C. pállidus** Lindl. (?*C. Delilianus* × *ovatus*). Brts. terete, slightly pubescent or nearly glabrous, often purplish: lvs. ovate-oblong or elliptic-oblong to oblong, 3–6 cm. long, obtuse, rounded or broad-cuneate at base, serrate, slightly pubescent chiefly on veins beneath or nearly glabrous; petiole 3–6 mm. long: fls. light blue in rather short panicles on long leafy brts.; rachis pubescent. B.R.26:20(c). Orig. before 1830.—Var. **róseus** Rehd. Lvs. larger, to 8 cm. long, usually ovate-oblong, less pubescent or nearly glabrous beneath: fls. pink. R.H.1875:30,t(c). (*C. ovatus* var. *r.* Carr., *C. r.* Koehne.) Orig. before 1830. Here belongs "Marie Simon," with flesh-colored fls.—Var. **plénus** Rehd. Lvs. similar to those of the preceding form: fls. white, pink in bud, double. Gn.77:432. Gn.M.28:7(h). (*C. americanus fl. pleno albo* Hort.)

6. **C. thyrsiflórus** Eschsch. Evergreen shrub or small tree to 10 m.; young brts. glabrous or slightly pubescent, sharply angled: lvs. oblong, 2–5 cm. long, obtuse, crenate-serrulate, lustrous above, light green and glabrous or appressed-pubescent beneath: petiole 6–15 mm. long: fls. blue, rarely white, in lateral narrow panicles 3–7 cm. long. Fl.v–vii. B.R.30:38(c). S.S.2:64. G.C.III.37:179(h);41:221,t(h). Gn.77:135(h),475(h). Ore. to Calif. Intr. 1837. Zone VII?—Var. **grìseus** Trel. Lvs. broad-ovate, minutely tomentulose beneath: fls. pale lilac. Gn.86:447(h).—A very fine free-flowering shrub with blue fls.; the hardiest of the taller evergreen species.

C. t. × *dentatus* = **C. Lobbiànus** Hook. Brts. terete: lvs. distinctly 3-nerved: fls. deep blue in oval peduncled heads. B.M.4810 (4811 by error). F.S.10:t.1016(c). Calif. Intr. 1853.—*C. t.* × *rigidus* = **Veitchiànus** Hook. Lvs. obovate, obtuse, glandular-serrate, grayish beneath: fls. deep blue, in dense panicled clusters 3–5 cm. long. B.M.5127(c). G.C.III.69:211(h);77:431(h). Calif. Intr. 1853.

7. **C. velutìnus** Dougl. Evergreen tall shrub to 3 or 4 m.; brts. glabrous: lvs. broad-elliptic, 5–7 cm. long, obtuse, rounded or subcordate at base, serrulate, dark green, glabrous and lustrous above, closely tomentose beneath with glabrescent veins; petiole to 12 mm. long: fls. white, in large compound panicles 8–12 cm. long. Fl.vi–vii. B.M.5165(c). G.C.II.22:232. B. C. to Calif. and Colo. Intr. 1853. Zone VII or VIII.

8. **C. coerùleus** Lag. Tall shrub; brts. terete, densely tomentose: lvs. ovate to oblong-ovate, 3–8 cm. long, acute or obtuse, rounded at base, serrate, with villous tawny or white tomentum beneath; petiole to 15 mm. long: fls. deep blue, in panicles 8–15 cm. long; pedicels villous, rarely glabrous. Fl.vii–ix. L.B.2:110(c). B.R.4:291(c). P.M.2:74,t(c). Gn.61:223(h);80:76(h). (*C. azureus* Desf.) Mex. Intr. 1818.—The species is not hardy within our area, but is the parent of many beautiful hardier hybrid forms.

9. **C. Féndleri** Gray. Deciduous, usually low, sometimes procumbent, rarely to 2 m. high; brts. terete, tomentulose, spinescent: lvs. elliptic to elliptic-lanceolate, 1–2.5 cm. long, entire or finely serrulate, grayish green and tomentulose beneath; petiole short: fls. white, in clusters 2–3 cm. long, at end of lateral leafy brts. Fl.vi–vii. R.H.1901:423(h). M.G.23:208;27:499(h). S.L.138(h). S. Dak. to N. Mex. and Ariz. Cult. 1893. Zone V.—Low shrub adapted for rockeries and sandy banks; the hardiest of the western Ceanothus.

10. **C. cuneàtus** Nutt. Evergreen shrub to 2 m., of spreading habit; brts. pubescent when young: lvs. cuneate-obovate to spatulate, 1–2.5 cm. long, obtuse, entire, dull grayish green, tomentulose beneath: fls. dull white or

bluish, in clusters 1–2 cm. across, on short lateral brts. Fl.IV–V. B.H.8:170. S.H.2:f.203g-k(l). Ore. to Calif. Intr. 1848. Zone VII or VIII.

A closely related species is **C. prostràtus** Benth. Procumbent: lvs. cuneate-obovate, coarsely spiny-toothed: fls. blue. S.H.2:f.203l-m(l). Wash. to Calif. Cult. 1886. Zone VII?

9. **DISCÀRIA** Hook. Deciduous shrubs with slender opposite spiny brs.: lvs. opposite or clustered, small; stipules connected by narrow ridges or lines: fls. perfect, 4–5-merous, sometimes apetalous, solitary or clustered: disk at base of the campanulate or tubular receptacle with free often undulate margin; stigma 3-lobed, ovary 3-celled: fr. 3-lobed, separating at maturity into 3 dehiscent parts. (Greek *diskos;* referring to the prominent disk.) About 12 species in S. Am., Austr. and N. Zealand.

D. serratifòlia Benth. Shrub to 4 m., with slender pendulous spiny brs.; spines 1.5–2.5 cm. long: lvs. ovate-oblong to oblong-lanceolate, 1–2.5 cm. long, shallowly crenate-serrate, glabrous and lustrous on both sides: fls. greenish white, campanulate, 3–4 mm. across, 5-merous, apetalous, in clusters on last year's brts.; sepals triangular-ovate. Fl.v. G.C.II.6:325. J.H.8:59. B.S.1:500. (*Colletia s.* Vent.) Chile, Patag. Intr. 1842. Zone VIII.—Grown for its distinct and graceful appearance and the fragrant fls. borne in great profusion.

The closely related **D. longispìna** Miers. with slender spines to 5 cm. long from Argentine (S.H.2:f.204a-f) is even less hardy.

10. **COLLÈTIA** Juss. Deciduous shrubs with opposite spines: lvs. caducous, opposite, small, usually obovate or spatulate, serrate; stipules not connected by lines: fls. small, perfect, 4–6-merous, solitary or fascicled: disk inconspicuous or with rolled-in margin, at base of the campanulate or tubular receptacle; petals minute or wanting, at the mouth of receptacle; ovary 3-celled; stigma 3-lobed: fr. dry, coriaceous, separating into 3 parts. (Named after Philibert Collet, French botanist; 1643–1718.) About 10 species in S. Am.

C. infaùsta N. E. Br. Glabrous shrub to 3 m.; brs. green, rigid, with sharply pointed terete and slightly curved spines 1–2.5 cm. long and about 2 mm. thick: lvs. with the short petiole 4–8 mm. long, elliptic-lanceolate to linear-lanceolate, acute, entire or serrate: fls. greenish white, the tube suffused with red and about 6 mm. long, with recurved ovate acute lobes, apetalous; anthers half-exserted. Fl.II–IV. B.M.3644(c). B.R.1776(c). G.C.III.60:132. Gn.75:605(as *C. cruciata*). (*C. horrida* Lindl., not Brongn., *C. spinosa* Lindl., not Lam.) Chile. Intr. 1823. Zone VIII.—Sometimes grown for its striking odd appearance.

A related species is **C. cruciàta** Hook. Brs. stout and rigid, with triangular much compressed spines, 1.5–4 cm. long and sometimes 2 cm. broad at base: lvs. elliptic-ovate, about 6 mm. long, serrate, caducous: fls. yellowish white, urn-shaped, about 6 mm. long, with 5 reflexed lobes: fr. 3-lobed. Fl.IX. B.M.5033(c). Add.8:286(c). Gt.16:t.543. G.C.II.8:617. Gn.55:293. S.H.2:299. (*C. bictoniensis* Lindl.) S. Braz., Uruguay. Intr. 1824. Zone VIII?—Sometimes slender brs. with nearly terete spines appear on plants of this species and this has given rise to the belief that it is identical with the preceding species.

Fam. 61. VITACEAE Lindl. GRAPE FAMILY

Shrubs, usually climbing by tendrils, rarely upright or small trees: lvs. alternate, simple or compound, stipulate: fls. bisexual or unisexual, regular, small, in cymes, corymbs or panicles, usually opposite a lf.; sepals 4–5, rarely 3–7, minute or obsolete; petals as many, valvate, rarely connate at base; stamens opposite the petals and as many; disk annular or lobed; ovary

superior, 2-, rarely 3–6-celled; each cell with 2, rarely 1 ovule; style 1 or wanting; stigma capitate, peltate or lobed: fr. a berry; seed albuminous; embryo small; cotyledons flat.—Ten genera with about 450 species, mostly in trop. and subtrop. regions.

A. Petals cohering at apex and cast off as a whole; infl. paniculate; bark without lenticels, finally separating in long strips (except in 2 species); pith brown: lvs. usually simple. 1. *Vitis*
AA. Petals free, expanding at anthesis: infl. usually cymose; bark with lenticels, not shredding; pith white.
B. Fls. 5-merous (rarely 4-merous and lvs. pinnate); infl. opposite the lf.: lvs. simple, digitate or pinnate to bipinnate.
C. Tendrils twining without disk-like tips: disk cupular, distinct from the ovary. 2. *Ampelopsis*
CC. Tendrils with disk-like adhesive tips, rarely without: disk adnate to the ovary, not distinct. 3. *Parthenocissus*
BB. Fls. 4-merous.
C. Infl. axillary: fr. 2–4-seeded: lvs. digitate or pedate.
D. Style nearly wanting; stigma 4-lobed: lfts. 1.5–6 cm. long. 4. *Tetrastigma*
DD. Style filiform; stigma small: lfts. 6–15 cm. long, stalked. 5. *Columella*
CC. Infl. opposite the lf.: brts. and lvs. more or less fleshy: fr. 1–2-seeded: lvs. ternate; lfts. sessile. 6. *Cissus*

1. **VÍTIS** L. Grape. Deciduous, rarely evergreen shrubs, climbing by tendrils; pith brown, interrupted at the nodes by diaphragms (except in No. 24): lvs. simple, dentate, usually lobed, rarely palmately compound: fls. polygamo-dioecious, 5-merous, in panicles opposite the lf.; sepals minute or obsolete; petals cohering at the apex and falling as a whole at anthesis; disk hypogynous, consisting of 5 nectariferous glands; ovary 2-celled; cells 2-ovuled; style conical, short; fr. a pulpy 2–4-seeded berry; seeds usually pyriform, with a contracted beak-like base, with 2 grooves on the ventral side. (Ancient Latin name of the grape.) About 60 species in the n. hemisphere, chiefly in the temp. regions.

Bark without lenticels, on older brs. separating in long strips and fibres; tendrils forked; seeds pyriform. (Subgen. Euvitis Planch.)
A. Brts. glabrous or tomentose: lvs. always simple (3–5-parted in var. of No. 1).
B. Lvs. green and glabrous or pubescent beneath (occasionally floccose-tomentose when young in No. 1).
C. Basal sinus of lvs. narrow.
D. Lvs. suborbicular, usually deeply 3–5-lobed, usually slightly floccose or pubescent beneath. 1. *V. vinifera*
DD. Lvs. ovate, undivided or slightly 3-lobed, glabrous beneath or pubescent only on veins. 2. *V. cordifolia*
CC. Basal sinus of lvs. wide.
D. Tendrils well developed; lvs. ovate to orbicular-ovate.
E. Young brts. and petioles red or reddish: diaphragm thick: lvs. usually distinctly lobed with rounded or obtuse sinuses.
F. Young brts. and lvs. beneath on veins pubescent: lvs. 12–25 cm. long, short-acuminate. 3. *V. amurensis*
FF. Young brts. and lvs. glabrous, lvs. 8–12 cm. long, long-acuminate. 4. *V. palmata*
EE. Young brts. green; diaphragm thin.
F. Lvs. 8–20 cm. long, coarsely toothed with triangular teeth.
G. Brts. usually glabrous: lvs. ovate, 3-lobed with acute sinuses. 5. *V. vulpina*
GG. Brts. usually pubescent: lvs. suborbicular, scarcely lobed. 6. *V. monticola*
FF. Lvs. 5–10 cm. long, undivided, denticulate or with very short broad teeth, pubescent on the veins beneath. 7. *V. flexuosa*
DD. Tendrils usually wanting or small: lvs. usually reniform, broader than high. 8. *V. rupestris*
BB. Lvs. tomentose beneath at least while young or glaucous.
C. Lvs. becoming glabrous or nearly so, green beneath.
D. Lvs. distinctly 3-lobed: brts. angled, pubescent. 9. *V. Baileyana*
DD. Lvs. indistinctly or slightly 3-lobed.
E. Lvs. ovate or broad-ovate.
F. Lvs. with very short, mucronulate teeth broader than high or denticulate.
G. Lvs. reticulate beneath, remotely denticulate, scarcely toothed: sides of basal sinus at right or wider angle: brts. terete. (See also var. of No. 16.) 10. *V. reticulata*
GG. Lvs. not reticulate, with very broad mucronulate teeth; sides of basal sinus at narrow angle: brts. angled. 11. *V. cinerea*
FF. Lvs. with coarse triangular acute teeth; basal sinus rounded, usually wide: brts. angled. 12. *V. arizonica*

EE. Lvs. orbicular-ovate to reniform, usually coarsely crenate-dentate with rounded mucronulate teeth.....13. *V. californica*
CC. Lvs. permanently tomentose or glaucous beneath; brts. terete.
D. Lvs. glaucous or glaucescent beneath, glabrous or nearly so.....14. *V. Lecontiana*
DD. Lvs. tomentose beneath, sometimes only floccose at maturity.
E. Lvs. floccose at maturity beneath.
F. Lvs. usually deeply lobed with round sinuses, ferrugineous-pubescent or floccose beneath at least on veins.....15. *V. aestivalis*
FF. Lvs. not or indistinctly lobed.
G. Lvs. brownish floccose beneath.....16. *V. Kaempferi*
GG. Lvs. grayish floccose beneath.....11. *V. cinerea*
EE. Lvs. densely and persistently tomentose beneath.
F. Tendrils intermittent (every third joint without tendril).
G. Lvs. not or slightly lobed, ovate to ovate-oblong, truncate or nearly so at base.....17. *V. pentagona*
GG. Lvs. deeply lobed.
H. Young brts. angled, grayish tomentose.....18. *V. Thunbergii*
HH. Young brts. terete, white-tomentose.....19. *V. candicans*
FF. Tendrils continuous; tomentum rusty.....20. *V. labrusca*
AA. Brts. with spines or glandular or lvs. partly compound.
B. Lvs. simple, slightly or not lobed.
C. Brts. with glandular bristles: lvs. pubescent and glandular beneath..21. *V. Romaneti*
CC. Brts. with prickles: lvs. glaucescent and glabrous or nearly so beneath.22. *V. Davidi*
BB. Lvs. partly compound, pubescent or glabrescent beneath.....23. *V. Piasezkii*
Bark with lenticels, close; tendrils simple: seeds ovoid. (Subgen. MUSCADINIA Planch.)
24. *V. rotundifolia*

1. V. vinífera L. WINE G. Stems to 15 or 20 m. long; young growth glabrous or floccose: lvs. suborbicular, 7–15 cm. across, cordate, 3–5-lobed with rounded sinuses, the lobes coarsely toothed and usually overlapping, glabrous or floccose beneath; petiole more than half as long as blade: panicles large and long: fr. usually ellipsoid, sometimes subglobose, black and bloomy to red and greenish. Fl.VI; fr.IX–X. F.D.21:t.2176(c). H.A.10:t.40(c). S.H.2:311.—Cult. from the earliest times in Eu. and W. Asia and often escaped; probably native of the Caucasian region. Zone (V)–VI.—Var. **apiifólia** Loud. PARSLEY G. Lvs. deeply 3–5-cleft with incisely lobed and deeply cut segments. Schmidel, Icon.t.8. L.A.1:f.140(l). Gn.54:425(h). (Var. *laciniosa* Ktze., *V. laciniosa* L.) Cult. 1648.—Var. **purpúrea** Bean. TEINTURIER G. Lvs. first claret red, later dull purple.—The spontaneous or subspontaneous form is sometimes distinguished as var. **sylvéstris** Willd. and the cultivated forms as var. **satíva** DC.—Extensively grown for its fr. in Eu. and California, the forms mentioned as ornamental vines.

2. **V. cordifólia** Michx. FROST G. Vigorous high climbing vine, the trunk sometimes to 50 or 60 cm. thick; diaphragms thick: lvs. broad-ovate, 10–12 cm. long, cordate with narrow acute sinus, undivided or indistinctly 3-lobed, irregularly and coarsely serrate with acute teeth, lustrous above, bright green beneath and glabrous or puberulous on the veins: panicles many-fld., 10–25 cm. long: fr. globose, about 1 cm. across, black, slightly glaucous, with thick skin, edible after frost. Fl.VII; fr.X. B.B.2:508. (Chicken G., Raccoon G., Winter G.) Pa. to Fla., E. Kans. and Tex. Intr. 1806. Zone V.—Var. **foètida** Engelm. Berries fetidly aromatic. Mo.

3. **V. amurénsis** Rupr. AMUR G. Strong growing vine; brts. obscurely angled, reddish and floccose when young: lvs. broad-ovate, 12–25 cm. long, cordate with broad round sinus, usually 3–5-lobed with rounded sinuses, the middle lobe broad-ovate, short-acuminate, apiculate-dentate, green beneath and glabrous or pubescent on the veins: panicle slender-stalked, elongated: fr. about 8 mm. across, black, 2–3-seeded. Fl.VI; fr.IX. Gt.10:t.339;13:t. 424,f.3–4(c). G.Z.12:160,t. Gn.54:425. (*V. vulpina* var. *a.* Reg.) Manch., Amur Reg. Intr. about 1854. Zone IV.—Ornamental vine with large lvs. changing to crimson or purplish in autumn.

V. a. × *Kaempferi* = *V. pulchra*. See under No. 16.

4. **V. rubra** Michx. Red G. Slender, but strong growing vine; brts. glabrous, bright red when young, angled; diaphragms thick: lvs. ovate, 8–12 cm. broad, deeply 3–5-lobed with round sinuses; lobes long-acuminate, coarsely toothed, dark green and lustrous above, bright green and glabrous or pubescent on the veins beneath; petiole red: panicle large and loose, long-stalked: fr. black, not bloomy, 7–10 mm. across; seed subglobose, often solitary. Fl.VII–VIII; fr.x. G.F.2:341. B.C.6:3486. (?*V. palmata* Vahl, *V. monosperma* Michx.—Cat G.) Ill. and Mo. to Tex. Intr. 1882. Zone V.—Graceful ornamental vine.

5. **V. vulpìna** L. Riverbank G. Vigorous high climbing vine; brts. glabrous; diaphragms very thin: lvs. broad-ovate or ovate, 8–18 cm. long, with a broad open basal sinus, usually 3-lobed, with short acuminate lobes, unequally and coarsely toothed with triangular acuminate teeth, lustrous, bright green beneath and glabrous or pubescent on the veins: fls. in panicles 8–18 cm. long, fragrant; the staminate with long erect stamens, the pistillate with shorter recurved stamens: fr. globose, 8 mm. across, purple black, densely bloomy. Fl.VI; fr.IX. B.M.2429(c). B.C.6:3486. B.B.2:507. A.G.1893:353. Gn.54:425(h). (*V. riparia* Michx., *V. odoratissima* Don, *V. cordifolia* var. *riparia* Gray, *V. odorata* Hort.) N. S. and N. B. to Man., Kans., Colo., Mo. and Tex. Intr. 1806. Zone I.—Var. **praècox** Bailey. June G. Fr. sweet, ripening in July.—Often grown as an ornamental vine for its handsome bright green foliage and the fragrant staminate fls.

V. v. × *Lecontiana* = **V. Slavínii** Rehd. Distinguished from *V. Lecontiana* by the lvs. being smaller, greenish or grayish green beneath and by the coarser serration; from *V. vulpina* by the partly deeply lobed lvs. more or less pubescent beneath, with rounded sinuses, the shorter much broader teeth and by the narrow and slenderer fruiting panicles. N. Y. Intr. 1920.—*V. v.* × *Kaempferi* = **V. Andersònii** Rehd. From *V. vulpina* it differs chiefly in the much larger, less deeply 3-lobed lvs. more pubescent beneath, in the narrower acute basal sinus and the shorter scarcely acuminate teeth; from *V. Kaempferi* in the more deeply 3-lobed lvs. very slightly or not floccose-tomentose beneath and in the coarser serration with triangular acute or short-acuminate teeth. Orig. before 1918.

Related species are: **V. Lôngii** Prince. Young shoots floccose or pubescent: lvs. more orbicular, with more angular teeth, duller and more pubescent beneath. Munson, Found. Grape Cult.t.33. (*V. Solonis* Planch., *V. nuevo-mexicana* Lemm.) Okla., N. W. Tex., N. Mex. and S. Colo. Cult. 1830. Zone V.—Possibly a hybrid between *V. rupestris* and *V. arizonica*.—**V. Treleâsei** Muns. Shrubby and little climbing; tendrils short and deciduous if not finding support; diaphragms twice as thick; stipules smaller: lvs. large broad-ovate to reniform-ovate, indistinctly 3-lobed, crenate-dentate; panicle 5–8 cm. long: fr. small, black with thin bloom, sweet. Munson, Found. Grape Cult.t.31. S. W. Tex., N. Mex., Ariz. Intr. 1887. Zone V.

6. **V. montícola** Buckl. Sweet Mountain G. Slender vine to 10 m.; young brts. floccose, sometimes glabrous, angled; diaphragms thin: lvs. suborbicular or reniform, 5–10 cm. across, basal sinus rounded to nearly truncate, coarsely toothed and often slightly 3-lobed, dark green and lustrous above, more or less pubescent and sometimes cobwebby beneath when young: panicle short and broad: fr. 12–14 mm. across, black or light-colored, sweet; seeds broadly pear-shaped, 5–7 mm. long. Fl.VI; fr.IX. B.C.6:3485. Munson, l.c.,t.27. S. W. Tex. Cult. 1887. Zone V.

A similar plant is **V. Champìni** Planch. Probably a hybrid between *V. candicans* and *V. rupestris* or *Berlandieri*. Lvs. reniform, pubescent or cobwebby when young; the growing tips usually white-tomentose: fr. 15 mm. across, black, slightly bloomy, sweet. Munson,l.c.,t.10. A.G.12:579. S. W. Tex. Cult. 1880.

7. **V. flexuòsa** Thunb. Slender vine; young growth rufous-tomentose: lvs. broad- or triangular-ovate, 5–8 cm. broad, acuminate, with broad open sinus or nearly truncate, unequally sinuate-dentate with short small teeth, sometimes angularly 3-lobed, lustrous above, pubescent or floccose on the veins

and in the axils beneath, thin and firm: panicle slender, 5–14 cm. long: fr. about 8 mm. across, black, 2–3-seeded. Fl.vi; fr.ix. S.H.2:f.209f-g[1](1). Japan, Korea, China. Cult. 1880. Zone V.—Var. **parvifòlia** Gagnep. Lvs. somewhat smaller, lustrous bronzy-green above, purple beneath when young. J.L.28:f.107(1). S.H.2:f.209h-h[1](1). (*V. p.* Roxb., *V. f.* var. *chinensis* Veitch.) Himal. to C. China. Intr. 1900.—Graceful vine; one of the smallest of the genus.

8. **V. rupéstris** Scheele. Bush G. Shrub to 2 m., sometimes slightly climbing; tendrils few and small or none; diaphragms thin: lvs. reniform to orbicular-ovate, 7–10 cm. wide, with very wide basal sinus or nearly truncate, coarsely toothed and sometimes slightly 3-lobed, lustrous above, glabrous at maturity or slightly pubescent on the veins beneath, somewhat glaucescent on both sides, thick and firm; panicle slender, 4–10 cm. long: fr. purple-black and somewhat glaucous, 7–14 mm. across, of pleasant taste; seeds small and broad. Fl.vi; fr.viii–ix. S.H.2:f.209i(1). B.B.2:508. S. Pa. to Tenn., Mo., Okla. and S. W. Texas. Intr. about 1860.

9. **V. Baileyàna** Muns. High climbing; stems with short internodes and often many short brts.: lvs. ovate to orbicular-ovate, 5–10 cm. long, cordate, toothed with rather small teeth, usually distinctly 3-lobed near apex, with short lobes, bright green above but not lustrous, grayish beneath and pubescent at maturity only on the veins: panicles compact, 8–12 cm. long: fr. 7–10 cm. across, black, not or slightly bloomy; seed small, broadly pear-shaped. Fl.vi; fr.ix. Munson,l.c.,t.24,39. (*V. virginiana* Muns., not Poir.) W. Va. and N. C. to Tenn. and Ga. Intr. about 1890. Zone V.

A related species is **V. Berlandièri** Planch. Spanish G. Lvs. lustrous above, gray-pubescent beneath at first, at maturity only on the veins; panicle 10–20 cm. long; fr. purple, slightly glaucous, pleasant-tasted. Munson,l.c.,t.23,39. B.C.6: 3487. S. W. Tex. and Mex. Intr. before 1883.

10. **V. reticulàta** Pamp. High climbing: young brts. floccose-tomentose; lvs. reddish when young, broad-ovate, 7–15 cm. wide, cordate to subcordate at the very base with the sides usually diverging at a right or wide angle, short-acuminate, sinuate-dentate or denticulate with short mucronate teeth, floccose-tomentose when young, at maturity glabrous above, cobwebby on the veins beneath and reticulate; panicle slender and narrow, with the stalk 10–20 cm. long: fr. black, bloomy, about 1 cm. across. Fl.vi; fr.ix–x. G.C. III.46:236. C. China. Intr. 1907. Zone (V).

A related species is **V. betulifòlia** Diels & Gilg. Brts. white-floccose when young: lvs. ovate to oblong-ovate, rarely broad-ovate, 5–10 cm. long, cordate to rounded or nearly truncate at base, acuminate, remotely denticulate to dentate with very broad mucronulate teeth, rarely slightly 3-lobed, whitish or tawny floccose-tomentose when young and usually thinly so at maturity; petiole usually 1–4 cm. long: panicle slender, 4–10 cm. long: fr. blue-black. C. and W. China. Intr. 1907. Zone V.

11. **V. cinérea** Engelm. Sweet Winter G. High climbing; young brts. gray-tomentose; diaphragms thick: lvs. broad-ovate, 8–20 cm. across, with wide basal sinus, usually distinctly 3-lobed or 3-angled, unequally toothed with short broad teeth, cobwebby above when young, dull dark green at maturity and with persistent gray cobwebby pubescence beneath: panicle irregular, 15–30 cm. long: fr. 10–14 mm. across, black, scarcely bloomy, becoming sweet after frost. Fl.vi; fr.x. B.C.6:3488. B.B.2:507. Munson,l.c. t.21,39. Ill. to Kans., Tex., Mex. and N. Fla. Cult. 1883. Zone V.—Var. **canéscens** Bailey. Lvs. almost as broad as long, not lobed. (*V. aestivalis* var. *c.* Engelm.) Mo. and S. Ill. to Tex.

12. **V. arizònica** Engelm. Canyon G. Usually low; brts. angled, with

short internodes and thick diaphragms; young growth white-tomentose: lvs. broad-ovate, 4–8 cm. wide, rarely larger, basal sinus wide to nearly truncate, not or indistinctly 3-lobed, with triangular pointed apex, sometimes distinctly lobed on vigorous shoots, dentate with short acute or mucronate teeth, white-cobwebby when young, finally nearly glabrous: panicle short and broad, slender-stalked: fr. 6–8 mm. across, black, pleasant-tasted. Fl.VI; fr.IX. Munson,l.c.t.30. Gn.54:427(h). W. Tex., N. Mex. and Ariz. to s. e. Calif. and n. Mex. Cult. 1890.

13. **V. californica** Benth. Usually high climbing; brts. with long internodes and thin diaphragms, white-tomentose when young: lvs. orbicular-ovate to orbicular-reniform, 7–12 cm. wide or more, basal sinus narrow to wide, finely to coarsely crenate-toothed with rounded mucronulate teeth, not or sometimes indistinctly 3-lobed, usually whitish cobwebby until half-grown and remaining pubescent beneath, rarely nearly glabrous: panicle long-stalked and usually forked: fr. about 1 cm. across, glaucous-white, rather dry, but pleasant-tasted; seeds large, pyriform. Fl.VI; fr.IX. B.C.6: 3488. Munson,l.c.t.28. Gn.36:143(h). Ore. to Calif. Cult. 1890. Zone VII? —The lvs. turn crimson in autumn.

14. **V. Lecontiana** House. BLUE G. Strong high climbing vine, with long internodes and thick diaphragms; young brts. usually glabrous and mostly glaucous: lvs. broad-ovate, 10–30 cm. wide, shallowly 3-lobed on old growth, deeply 3–5-lobed on vigorous shoots, basal sinus deep to shallow, shallowly or sinuately toothed, dull green and glabrous above, glaucous beneath and glabrous or sparingly pubescent on the veins, rather thin; petiole long: panicle 5–10 cm. long, usually long-stalked: fr. about 1 cm. across, purple-black and densely glaucous, sour but pleasant-tasted; seeds rather small and broad. Fl.VI; fr.IX. B.C.6:3489. B.B.2:507. Munson,l.c.t.13. W.A.88,t(h). (*V. bicolor* Leconte, not Raf., *V. argentifolia* Muns.—Summer G.) N. E. and Ill. to N. C. and W. Tenn. Intr. before 1890. Zone V.—Handsome evergreen vine, easily recognized by the glaucous under side of the large lobed lvs.

V. L. × *vulpina* = *V. Slavinii;* see under No. 5.

15. **V. aestivalis** Michx. SUMMER G. Strong high climbing vine, with medium or rather short internodes and thick diaphragms; young brts. floccose: lvs. broad-ovate, 10–30 cm. wide, similar to those of the preceding species, basal lobes often overlapping, more coarsely toothed, dull and glabrescent above, with rusty floccose tomentum beneath, partly persisting at least on the veins; petiole floccose; panicle 10–25 cm. long, slender: fr. about 8 mm. across, black, bloomy, dryish and astringent to juicy and sweet. Fl.VI; fr.IX. Munson,l.c.t.14. B.B.2:506. Am. For.26:286(trunk). (*V. labrusca* var. *a.* Reg.) N. Y. to Mo., Fla., and Miss. Intr. 1656. Zone V.—Var. **Bourquiniana** Bailey. Lvs. only slightly rusty beneath, the pubescence usually grayish or dun-colored, of thinner texture: fr. large and juicy, black to amber-colored. Munson,l.c.t.18. (*V. B.* Munson.) Possibly hybrid. Intr. about 1847.—Strong growing ornamental vine easily recognized by the brown cobwebby tomentum on the under side of the large lobed lvs.; the var. cult. for its fr.

A related species is **V. Linsecomii** Buckl. Bushy or high climbing, but stocky: lvs. as long as broad or little longer, 3-lobed, tomentose beneath; panicle 5–10 cm. long: fr. 12–20 mm. across, black, bloomy, pleasant-tasted; seeds 6–10 mm. long. Munson,l.c.t.11. Mo. to Tenn., La. and Tex. Intr. about 1860. Zone V.—Var. **glauca** Muns. Lvs. glaucous below, veins rusty-pubescent. Munson,l.c.t.12. Mo. to Tex.

16. **V. Kaèmpferi** K. Koch. Strong growing vine; young brts. floccose-tomentose: lvs. orbicular-ovate, 10–25 cm. broad, deeply cordate with narrow sinus, unequally and shallowly toothed or denticulate, indistinctly lobed, dull and rugose above, nearly glabrous, grayish or rusty-tomentose beneath, reticulate; panicle short, pedunculate: fr. about 8 mm. across, black with purple bloom, not edible. Fl.VI–VII; fr.IX–X. R.H.1892:342;1898:426–8. G.C.III.22:305. B.C.6:3491. Gn.63:124(h),209(h). (*V. Coignetiae* Pulliat, *V. Thunbergii* Hort., not Sieb. & Zucc.) Japan. Intr. 1875 and before. Zone V. —Var. **glabréscens** Rehd. Lvs. becoming glabrescent beneath at maturity. (*V. Coignetiae* var. *g.* Nakai.) Cult. 1890.—Handsome ornamental vine with very large heavy foliage turning crimson in autumn.

V. K. × *vulpina* = *V. Andersonii*; see under No. 5.

A related species or possibly hybrid with *V. amurénsis* is **V. pulchra** Rehd. Brts. sparingly floccose, reddish: lvs. 7–12 or 15 cm. wide, coarsely dentate and often slightly 3-lobed, shallowly cordate or nearly truncate at base, crimson when unfolding, becoming lustrous bronzy green above, purplish beneath, later deep green, slightly floccose-tomentose beneath and pilose on the veins: panicle narrow, 6–10 cm. long. (*V. flexuosa major* Hort.) Orig. unknown, intr. about 1880? Zone (V).

17. **V. pentagòna** Diels & Gilg. Brts. gray-tomentose when young, reddish: lvs. ovate, 8–12 cm. long, truncate or nearly so at base, sinuate-denticulate and slightly 5-angled, slightly pubescent on the veins above, grayish or reddish tomentose beneath; petiole 4–9 cm. long: panicle to 16 cm. long, tomentose: fr. 6–7 mm. across; seed pyriform, about 4 mm. long. Fl.VI; fr.IX. S.H.2:f.207l(l). C. and W. China. Cult. 1890. Zone V.—Var. **béllula** Rehd. & Wils. Lvs. 3–5 cm. long, similar to those of *V. flexuosa* var. *parvifolia*, but tomentose beneath. Intr. 1907.

A related species is **V. lanàta** Roxb. Young brts. tomentose: lvs. ovate, 8–15 cm. long, cordate, not lobed, tomentose beneath; panicle short; fls. small, the petals sometimes separating at the top: fr. purple, 5 mm. across. China, Liukiu Isls., Himal. Intr. ? Zone VII?

18. **V. Thunbérgii** Sieb. & Zucc. Slender vine; young brts. angled, rusty-tomentose: lvs. deeply 3–5-lobed, 6–10 or to 14 cm. across, cordate, the lobes broad-ovate with rounded sinuses or sometimes with short lobes and acute sinuses, shallowly and irregularly toothed, dark dull green above and glabrous, rusty tomentose beneath: panicle 5–8 cm. long: fr. black with purple bloom, 8–10 mm. across. Fl.VII–VIII; fr.IX–X. B.M.8558(c). R.H. 1880:210,t(c),279;1882:221. S.H.2:f.207c-d. (*V. Sieboldii* Hort.) Japan, China. Cult. 1879. Zone V.—Var. **sinuàta** Rehd. Lvs. smaller, deeply 3–5-lobed with broad rounded sinuses and often lobulate lobes. Gt.22:t.765,f.1. N.K.12:t.5. Japan, China. Cult. 1873.—Graceful vine; lvs. turning crimson in autumn.

19. **V. cándicans** Engelm. Mustang G. Strong high climbing vine; young growth white-tomentose; diaphragms very thick: lvs. broad-ovate to ovate-reniform, 6–12 cm. broad, basal sinus broad and open or nearly truncate, indistinctly lobed or angled, on vigorous shoots deeply 3–5-lobed, sinuately and shallowly toothed, white-tomentose on both sides when young, later dark green and glabrous above, white-tomentose beneath; petiole 3–6 cm. long, white-woolly: panicle 5–12 cm. long: fr. 1.5–2 cm. across, purple or light-colored, with tough skin and of disagreeable taste. Fl.VI; fr.VII–VIII. Munson,l.c.t.8,37. S.H.2:f.207h-i(l). (*V. mustangensis* Muns.) Okla. and Ark. to Tex. Cult. 1860. Zone V?

A related species or hybrid with *V. vulpina* is **V. Doaniàna** Muns. Internodes rather short; diaphragms thin: lvs. orbicular-ovate, 3-lobed at apex, coarsely toothed, bluish green, usually more or less floccose above, tomentose beneath:

panicle small: fr. 12–15 mm. across, black, bloomy, sweet. G.F.9:455. Muns n, l.×t.9,37. Okla. to Tex. and N. Mex. Cult. 1890.—*V. c.* ×? *rupestris;* see *V. Champini* under No. 6.

20. **V. labrúsca** L. Fox G. Strong growing vine; shoots with a tendril or infl. at every joint, floccose when young: lvs. orbicular-ovate or broad-ovate, 7–16 cm. wide, basal sinus usually open, undivided or slightly 3-lobed, rarely deeply lobed with rounded sinuses, shallowly and irregularly toothed, dark green above, tomentose beneath, at first whitish, later dun-colored or rusty, thick and strongly veined: panicle little branched, 5–10 cm. long: fr. globose, 1.5–2 cm. across, purple-black, sometimes red-brown or amber-green, with thick skin and of sweetish musky taste. Fl.VI; fr.IX. Gr.G.2:t.161. B.B.2:506. Munson,l.c.t.6,38. N. Eng. to Ga., Tenn. and S. Ind. Intr. 1656. Zone V.—The parent species of the greater part of the cult. American grapes; also grown for its luxuriant growth and handsome foliage.

21. **V. Romanéti** Roman. Vigorous vine; young shoots floccose-pubescent and glandular-bristly, purplish when young: lvs. orbicular-ovate, 10–25 cm. wide, deeply cordate, obscurely 3-lobed, shallowly toothed, the teeth with bristle-like tip, dark green above and slightly pubescent on the veins or nearly glabrous, grayish tomentose beneath, pilose and sparingly glandular-bristly on the veins, of firm texture; petiole floccose and glandular-bristly; panicle longer than lvs.: fr. black, 1 cm. across, edible. Fl.V–VI; fr.VII–VIII. R.H. 1890:444,t(c). J.L.28:f.98(l). (*V. rutilans* Carr.) China. Intr. 1881. Zone VII?—Handsome ornamental vine conspicuous on account of the purple young growth with bristly pubescence.

22. **V. Davídi** Foëx. Vigorous vine: shoots with straight or slightly recurved prickles, glabrous: lvs. broad-ovate, 10–20 cm. long, cordate, acuminate or acute, sinuate-denticulate and obscurely angled, lustrous dark green and glabrous above, glaucous and nearly glabrous beneath except glandular-bristly on veins and on the petiole: panicle usually longer than lf: fr. black, about 1.5 cm. across. Fl.VI–VII; fr.IX–XI. R.H.1885:55;1890:465. J.L.28: f.17,83(h),85. (*V. Davidiana* Dipp., *V. armata* Diels & Gilg, *Spinovitis D.* Roman.) China. Cult. 1885. Zone VI or VII.—Var. **cyanocárpa** Sarg. Less prickly: fr. bluish. J.L.28:389,t(c),f.84(h),89. S.L.427(h). (*V. armata* var. *Veitchii* Veitch.)—Handsome vine; the lvs. changing to brilliant red in autumn.

23. **V. Piasézkii** Maxim. Young brts. and petioles rufous-pubescent and glandular-bristly: lvs. variable on same branch, ovate and slightly or deeply lobed, 4–8 cm. long, cordate with rounded sinus, or 3–5-foliolate, the middle lft. stalked, rhombic-ovate or ovate, 5–12 cm. long, acute or short-acuminate, cuneate, the lateral ones sessile and very oblique, smaller, coarsely and angularly toothed, glabrous above, with floccose tomentum beneath, persisting at least on the veins: panicle to 12 cm. long, branched: fr. about 1 cm. across, black, bloomy. Fl.V–VI; fr.VIII–IX. J.L.28:f.99. S.H.2:f.206a-a^1. (*Parthenocissus sinensis* Diels & Gilg.) W. China. Intr. 1807. Zone VI or VII?—Var. **Pagnúccii** Rehd. Brts. glabrous: lvs. glabrous or nearly glabrous beneath. R.H.1888:f.134;1889:204,t(c). S.H.2:f.206g-g^1. (*V. P.* Roman., *Ampelovitis Davidii* Carr., *Ampelopsis Davidiana* Mottet.) C. China. Cult. 1885. Zone (V).

24. **V. rotundifòlia** Michx. Muscadine. Vigorous vine to 30 m., with close lenticellate bark, sometimes producing aërial roots; pith without diaphragms; tendrils simple; lvs. suborbicular to broad-ovate, 5–12 cm. wide, acute or acuminate, with shallow basal sinus, coarsely toothed with triangular

teeth, glabrous and lustrous above, yellowish green and glabrous beneath or slightly pubescent on veins: panicle dense, small: fr. globose, 1.5–2.5 cm. across, dull purple, not bloomy, with very tough skin, of musky flavor. Fl.VI; fr.VIII–IX. B.B.2:509. Munson,l.c.t.35,39. (*Muscadinia r.* Small, *V. muscadina* and *V. verrucosa* Hort.) Del. to N. Fla., w. to Mo., Kans., Tex. and Mex. Intr. 1806. Zone V.

2. **AMPELÓPSIS** Michx. Deciduous shrubs, climbing by tendrils: brs. with close lenticellate bark and white pith: winter-buds small, with several outer scales: lvs. alternate, simple or compound, long-petioled: fls. perfect, small, greenish, in long-peduncled dichotomous cymes, opposite the lvs. or terminal, 5-merous, rarely 4-merous; calyx indistinct; petals expanding; stamens short: ovary 2-celled, adnate to a distinct cup-shaped disk, entire or crenulate at the margin; style slender: fr. a 1–4-seeded berry. (Greek *ampelos*, grape, and *opsis*, likeness.) About 20 species in N. Am., C. and E. Asia.

A. Lvs. simple, undivided or lobed.
  B. Lvs. whitish beneath, of firm texture.
    C. Fr. pale yellow or pale bluish or whitish: lvs. bright green and lustrous above. 1. *A. humulifolia*
    CC. Fr. dark blue or violet: lvs. usually not or slightly lobed with shallow rounded mucronulate teeth, with a velvety sheen above when young. 2. *A. micans*
  BB. Lvs. green beneath, thin.
    C. Lvs. not or slightly lobed: fr. bluish or greenish. 3. *A. cordata*
    CC. Lvs. 3–5-lobed, rarely scarcely lobed: fr. finally blue. 4. *A. brevipedunculata*
AA. Lvs. compound, sometimes partly simple.
  B. Lvs. 3–5-parted or digitate, sometimes partly simple and 3-lobed.
    C. Segments of lvs. serrate or pinnately lobed, lower lvs. sometimes simple.
      D. Fr. dark blue; peduncles 1–3 cm. long: lvs. usually pubescent beneath, segments shallowly dentate. 5. *A. Delavayana*
      DD. Fr. orange, sometimes bluish before maturity: peduncle 2–5 cm. long: lvs. glabrous beneath or pilose only on the veins; segments usually lobed. 6. *A. aconitifolia*
    CC. Segments of lvs. at least partly pinnate; rachis broadly winged and the pinnae articulate. 7. *A. japonica*
  BB. Lvs. pinnate or bipinnate; lfts. petioled.
    C. Lfts. 1–4 cm. long, coarsely toothed. 8. *A. arborea*
    CC. Lfts. 5–10 cm. long, crenate-serrate. 9. *A. megalophylla*

1. **A. humulifòlia** Bge. Climbing shrub; brts. glabrous, rarely slightly villous: lvs. broad-ovate, 7–12 cm. long, truncate or cordate with a wide round sinus, 3–5-lobed with rounded sinuses, sometimes slightly lobed, with acute or acuminate coarsely dentate lobes, lustrous bright green and glabrous above, glaucescent and glabrous or pilose on the veins beneath; cymes loose; peduncles slender, longer than petioles: fr. usually few, 6–8 mm. across, usually pale yellow, with bluish cheek, or entirely pale yellow or pale blue, 1–2-seeded. Fl.VII; fr.x. R.H.1868:29. N.I.4:187. Gn.7:199. (*Cissus Davidiana* Carr., *Vitis D.* Nichols.) N. China. Cult. 1868. Zone V.—Ornamental vine with handsome foliage resembling that of a true Vitis.

2. **A. micans** Rehd. Climbing to 6 m.; young growth purplish; brts. glabrous: lvs. triangular-ovate and not lobed or broad-ovate and slightly lobed, 5–10 cm. long, subcordate or sometimes truncate at base, short-acuminate, the lateral lobes acute, shallowly and coarsely crenate-serrate, dark green and with a velvety sheen above when young, glaucescent below: cymes long-stalked, rather dense: fr. dark blue. Fl.V–VI; fr.x. ? J.L.28:f.90. Veitch, Novelties, 1905:5(h,l);1908–9:29(h). (*Vitis repens* Veitch, not Wight & Arn., *Vitis flexuosa Wilsonii* Veitch.) C. China. Intr. 1900.—Var. **cinérea** Rehd. Lvs. grayish pubescent on both sides or only beneath, often deeply 3–5-lobed Intr. **1907.**—Handsome vine similar to the preceding.

A related species is **A. vitifòlia** Planch. Without tendrils; glabrous: lvs. broad-ovate, 4–7 cm. wide, truncate or subcordate at base, undivided or slightly 3-lobed,

coarsely dentate with triangular acuminulate teeth: cymes slender-stalked. S.H. 2:f.213k-l(l). (*A. aegirophylla* Planch., *Vitis persica* Boiss.) Persia and Turkest. to N. W. Himal. Cult. 1885. Zone VI?

3. **A. cordàta** Michx. High climbing, nearly glabrous: lvs. round ovate, 5–12 cm. long, acuminate, subcordate or nearly truncate, not or indistinctly 3-lobed, acutely but shallowly serrate, glabrous or sparingly pubescent along the veins and in the axils beneath; petiole shorter than blade, often pubescent: cymes slender-stalked, loose: fr. 6–8 mm. across, bluish or greenish blue. Fl.VII; fr.IX–X. M.N.2:t.6(c). B.B.2:509. Ohio Nat.1:t.1,f.1–2,3–4(h). (*Vitis indivisa* Willd.) Va. to Ohio and Ill., Fla., Tex. and Mex. Cult. 1796. Zone V.

4. **A. brevipedunculàta** Koehne. Vigorous climber; young brts. hairy: lvs. broad-ovate, 6–12 cm. long, acuminate, cordate, 3-lobed, the lateral lobes broadly triangular-ovate, spreading, coarsely serrate, dark green above, lighter beneath and pilose; petioles as long as blade or shorter, hairy: cymes on pilose stalks 1.5–3.5 cm. long: fr. 6–8 mm. across, changing from pale lilac to verdigris color and finally to bright blue, rarely whitish. Fl.VII–VIII; fr.IX–X. B.C.1:277. S.H.2:f.213d²(l). Gn.85:557. (*A. heterophylla* var. *amurensis* Planch., *Vitis b.* Dipp.) N.E. Asia. Cult. 1870. Zone V or IV.—Var. **Maximowíczii** Rehd. Brts. and lvs. glabrous or glabrescent: lvs. more deeply 3–5-lobed, with rounded sinuses; peduncles longer. B.M.5682(c). Gt.22:t.765,f.2. Gn.87:541. S.H.2:f.213b-d(l). (*A. heterophylla* Sieb. & Zucc., not Bl., *Vitis h.* Thunb., *V. h.* var. *humulifolia* Hook.) E. Asia. Cult. 1868. —Var. **élegans** Rehd. Lvs. usually smaller, variegated with white and greenish white and tinged pink while young. H.F.1866:103,t(c). Witte, Flora,t. 74(c). Gn.54:5. (*Vitis e.* K. Koch, *A. heterophylla* f. *e.* Voss, *A. heterophylla tricolor* Hort.) Cult. 1855.—Var. **citrulloìdes** Rehd. A form with more deeply 5-lobed lvs., the middle lobe and sometimes the lateral lobes sinuately lobed or toothed with wide sinuses and much constricted near base and middle. (*A. c.* Lebas, *A. heterophylla c.* Hort.) Cult. 1875.—Ornamental vine, particularly handsome in autumn with its strikingly colored fr.

5. **A. Delavayàna** Planch. Vigorous vine; young growth hairy and usually reddish: lvs. broad-ovate, 5–12 cm. long, cordate, acuminate, cordate, slightly or deeply 3-lobed and partly 3-parted, the middle segment elliptic-oblong, cuneate, the lateral ones very oblique, usually semicordate, coarsely and shallowly crenate-dentate with rounded mucronulate teeth, usually pubescent beneath; cymes on peduncles 1–3 cm. long, pubescent, rarely nearly glabrous: fr. dark blue, small. Fl.VII; fr.X. J.H.28:f.102(l). Gn.89:272(l). S.H.2:f. 214g(l). (*Vitis D.* Franch., *A. heterophylla* var. *D.* Gagnep.) C. China. Intr. 1900. Zone V.—Occasionally brs. with all the lvs. simple occur and such specimens are almost indistinguishable from *A. brevipedunculata.*

6. **A. aconitifòlia** Bge. Slender luxuriant vine; brts. glabrous: lvs. 5-foliolate, long-stalked; lfts. lanceolate or rhombic-lanceolate, 4–7 cm. long, pinnately lobed, often divided nearly to the midrib, with rather narrow toothed or entire lobes, green beneath and glabrous or pilose on the veins: fls. in slender-stalked glabrous cymes: fr. about 6 mm. across, orange or yellow when fully ripe, sometimes bluish before maturity. Fl.VIII; fr.IX–X. R.H. 1868:10;1883:318. Gn.5:523. Gn.54:427(h, as *Vitis serjaniaefolia*). J.L.28: f.87. N.I.1:66. (*Vitis a.* Hance, *A. dissecta* Carr. *A. a.* var. *dissecta* Koehne.) N. China. Cult. 1868. Zone V.—Var. **palmíloba** Rehd. Lvs. usually 3-parted; the lower lvs. often only 3-lobed; segments usually rhombic, coarsely toothed and lobed, rarely pinnatifid. R.H.1867:10. J.L.28:87(form with narrow seg-

ments). (*A. p.* Carr., *A. tripartita* Carr., ?*A. rubricaulis* Schneider, not Carr., *A. aconitifolia* Koehne, not Bge.)—Very graceful vine.

7. **A. japónica** Mak. Root tuberous: brts. glabrous: lvs. 3–5-foliolate; lfts. partly pinnate and partly pinnately lobed, the middle one 4–10 cm. long, the lower ones much smaller and usually simple, rachis broadly winged, the pinnae articulate, ovate to oblong-ovate, acute or acuminate, cuneate, sparingly and coarsely toothed, shining dark green above, glabrous, chartaceous; petiole 1–6 cm. long; cymes small, on slender often twining stalks 3–8 cm. long: fr. 5–7 mm. across, blue, punctate. Fl.VII–VIII; fr.IX–X. Gt.16:t.531. I.T.5:t.176. R.H.1870:17. Gn.6:365. N.I.1:66. (*A. serjaniaefolia* Bge., *Vitis s.* Franch. & Sav.) Japan, N. China. Cult. 1867. Zone VI?—Handsome graceful vine with lustrous foliage.

8. **A. arbórea** Koehne. Pepper-Vine. Slender vine; brts. glabrous or nearly so: lvs. bipinnate, 10–20 cm. long; petiole 1–4 cm. long; lfts. broad-ovate or rhombic-ovate to obovate, 1–4 cm. long, acute to acuminate, broad-cuneate to rounded at base, the terminal one stalked, the lateral ones short-stalked to subsessile, coarsely toothed, dark green above and glabrous, pubescent on the veins beneath at least when young: fls. usually 5-merous in loose long-stalked cymes: fr. about 8 mm. across, dark purple. Fl.VIII; fr.IX–X. B.B.2:510. S.H.2:f.214a-b. (*A. bipinnata* Michx., *Vitis a.* L., *Cissus stans* Pers.) Va. to Mo., Fla., Tex. and Mex. Intr. 1700. Zone VII?—Handsome graceful vine.

A closely related species is **A. orientàlis** Planch. Lvs. bipinnate, biternate or simply pinnate; lfts. 9–15, 2–7 cm. long, the terminal one often rounded at base, glabrous beneath; petiole 3–5 cm. long: fls. 4-merous: fr. red. S.H.2:f.214c-e. G.C.1871:1615. (*Vitis o.* Boiss., *Cissus o.* Lam.) Asia Minor, Syria. Intr. 1818. Zone VI?

9. **A. megalophýlla** Diels & Gilg. Climbing to 10 m.; glabrous: lvs. long-petioled, doubly pinnate or the smaller ones simply pinnate, 20–60 cm. long; segments 7–9, the one or two lower pairs pinnate; lfts. stalked, ovate to ovate-oblong, 5–12 cm. long, rounded or subcordate at base, coarsely toothed, pale or glaucescent beneath, the veins ending in the teeth: cymes loose and slender: fr. turbinate, 6 mm. across, black. Fl.VIII; fr.IX–X. B.M.8537(c). J.L.28: f.16,86(h),97. Gn.65:45. S.L.98(h). (*Vitis m.* Veitch.) W. China. Intr. 1894. Zone VI or VII.—Handsome vigorous vine with large compound lvs.

A related species is **A. Watsoniàna** Wils. Lvs. simply pinnate, to 30 cm. long; lfts. 3–7, elliptic to oblong, 4–11 cm. long, acuminate, rounded or broad-cuneate at base, remotely dentate, purplish beneath, glabrous. J.L.28:f.95,96. (*V. leeoides* Veitch, not Maxim.) C. China. Intr. 1900. Zone VII or VIII.

3. **PARTHENOCÍSSUS** Planch. Deciduous or rarely evergreen climbing shrubs: bark close, lenticellate; pith white; tendrils with adhesive tips, rarely without; winter-buds rounded, with 2 or 4 outer scales: lvs. digitate or partly 3-lobed, long-petioled: fls. perfect, rarely polygamous, in peduncled compound cymes opposite the lvs., often crowded at the ends of the brts. and forming panicles; calyx minute; petals 5, rarely 4, spreading; style short and thick; disk indistinct; ovary 2-celled; cells 2-ovuled: fr. a 1–4-seeded dark blue or bluish black berry. (Greek *parthenos*, virgin, and *kissos*, ivy; translation of its French name.) Syn.: *Quinaria* Raf., *Psedera* Neck.) About 10 species in N. Am., E. Asia and Himal.

A. Lvs. 5-foliolate.
  B. Young brts. terete.
    C. Tendrils with 3–5 brs., without adhesive disks: cymes solitary.....1. *P. vitacea*
    CC. Tendrils with 5–12 brs., with adhesive disks: cymes usually crowded into terminal panicles.....2. *P. quinquefolia*

BB. Young brts. quadrangular: lfts. usually with white markings and purplish below when young.....3. *P. Henryana*
AA. Lvs. partly 3-foliolate and partly simple, 3-lobed.....4. *P. tricuspidata*

1. **P. vitàcea** Hitchc. Usually low and rambling over bushes, rarely high-climbing; young growth green; tendrils with 3–5 twining brs., only occasionally with an adhesive disk: lfts. elliptic to oblong, 5–12 cm. long, acuminate, usually cuneate at base, coarsely and sharply serrate, dark green and lustrous above, lighter and usually lustrous beneath, glabrous: cymes dichotomous, on peduncles 3–7 cm. long: fr. bluish black, usually slightly bloomy, about 8 mm. across, 3–4-seeded. Fl.VI–VII; fr.VII–VIII. B.M.2443(c). F.D.21:t. 2177(c). S.T.1:t.89. (*Vitis v.* Bean, *P. dumetorum* Rehd., *P. quinquefolia* Graebn., not Planch., *P. laciniata* Small, *Ampelopsis quinquefolia* var. *v.* Knerr.) N. Eng. to Mich. and Assina., s. to Tex. and Colo. Cult. before 1800. Zone III or II.—Var. **macrophýlla** Rehd. Lfts. large, elliptic, sometimes to 18 cm. long and to 10 cm. broad. (*A. m.* Hort., *A. quinquefolia* var. *latifolia* Dipp.)—Var. **dùbia** Rehd. Young brts. and lfts. at least on the veins beneath pilose. (*P. hirsuta* Graebn., not Small.)—Var. **laciniàta** Rehd. Lfts. smaller and narrower, more deeply and incisely serrate with flaring teeth, usually yellow-green. Wyo. to N. Mex. Intr. 1898.—This species does not cling to walls and may be used for covering arbors, rocks and bushes.

A closely related species is **P. heptaphýlla** Small. Lfts. usually 7, oblong-obovate, 3–6 cm. long, coarsely serrate. S.T.1:t.90. (*P. texana* Rehd., *Ampelopsis heptaphylla* Buckl.) Tex. Intr. about 1900. Zone VII–VIII.

2. **P. quinquefòlia** Planch. VIRGINIA CREEPER. High climbing; young growth reddish; tendrils with 5–8 brts. ending in adhesive tips: lfts. stalked, elliptic to obovate-oblong, 4–10 cm. long, acuminate, usually cuneate, coarsely and often crenately serrate, dull green above, glaucescent beneath; cymes usually forming terminal panicles: fr. bluish black, slightly bloomy, 6 mm. across, with usually 2 or 3 seeds. Fl.VII–VIII; fr.IX–X. Em.2:535,t(c). M.Am. 1:t.40(c). Gr.G.2:t.162. S.T.1:t.88. S.L.284(h). (*Vitis q.* Lam., *Ampelopsis q.* Michx., *A. hederacea* DC., *A. virginiana* Hort.) N. Eng. to Fla. and Mex., w. to Ohio, Ill. and Mo. Intr. 1629. Zone V.—Var. **Engelmánnii** Rehd. Does not differ from the type except in its smaller lfts. (*P. E.* Graebn., *Ampelopsis E.* Hort.)—Var. **muròrum** Rehd. Tendrils with shorter and more numerous, usually 8–12 brs.; lfts. usually broader, the outer ones usually broad-ovate and rounded at base. S.H.2:f.211d(l). M.G.21:25(h). (Var. *latifolia* Rehd., *P. radicantissima* Graebn., *Ampelopsis radicantissima* Schelle, *A. muralis* Hort.) The more southern form.—Var. **mínor** Rehd. A form of the preceding var. with smaller and broader, oval to orbicular-ovate lfts., rounded at base, on petiolules 6–8 mm. long.—Var. **hirsùta** Planch. Young brts., infl. and lfts. beneath soft pubescent, usually bright red while young. Gt.48:t.1462(c). (*P. h.* Small, *Ampelopsis h.* Donn, *A. Graebneri* Bolle, *A. pubescens* Schlecht., *A. radicantissima* Hort.) N. Eng. to Mex.—Var. **Saint-Paùlii** Rehd. Brts. sometimes with aërial rootlets; tendrils with 8–12 brs.: lfts. oblong-obovate, cuneate, short-stalked, pubescent beneath, sharply serrate with usually flaring teeth: panicles elongated. R.H.1907:567. S.H.2:f.212i(l). S.T.1:t.88,f.9,10. (*P. S.* Graebn., *Ampelopsis S.* Hort.) Iowa and Ill. to Mo. and Tex.—Handsome vigorous vine clinging firmly to walls and tree-trunks; the lvs. turning scarlet and crimson in autumn.

A related species is **P. laetèvirens** Rehd. Tendrils with 5–8 slender brs.: lvs. obovate or elliptic, remotely and often coarsely serrate, bright yellow-green, glabrous or pubescent on the veins beneath. C. China. Intr. 1907. Zone VII?

3. **P. Henryàna** Diels & Gilg. High climbing; young brts. angled; tendrils with 5–7 slender brs.: lfts. stalked, elliptic-ovate to cuneate-obovate, 3–6 cm.

long, acuminate, toothed usually only above the middle, velvety green above and variegated with white along the veins at least when young, purplish beneath and glabrous or pubescent only on the midrib: fls. in narrow panicles 8–15 cm. long: fr. dark blue, usually 3-seeded. Fl.VII; fr.X. G.C.III.38:309; 39:354. Gn.69:341. J.L.28:f.92(l). R.H.1907:211. S.L.283(h). (*V. H.* Hemsl., *Ampelopsis H.* Hort.) C. China. Intr. about 1895. Zone VIII?—Very handsome vine; the striking coloring of the lvs. is more pronounced in a partly shaded position; it disappears in the full sun.

A closely related species is **P. Thomsòni** Planch. Young brts. and lvs. purplish when young; tendrils with 3–5 brs.: lfts. long-acuminate, glabrous or slightly pubescent on the midrib beneath: fls. in slender-stalked cymes opposite the lf.: fr. black. Gn.63:203. J.L.28:f.100. (*P. Henryana* var. *glaucescens* Diels & Gilg, *Vitis T.* Laws., *Ampelopsis T.* Hort.) Himal., C. China. Intr. 1900. Zone VII?

4. **P. tricuspidàta** Planch. BOSTON IVY. High climbing; tendrils short, much-branched: lvs. slender-stalked, broad-ovate, 10–20 cm. wide, 3-lobed with acuminate coarsely serrate lobes, or, chiefly on young plants and basal shoots, smaller and partly 3-foliolate with stalked lfts., the middle one obovate, the lateral ones obliquely broad-ovate, partly simple and broad-ovate, coarsely serrate and not or slightly lobed, glabrous and lustrous above, pubescent on the veins beneath; cymes usually on short 2-lvd. brts., narrow and somewhat elongated: fr. bluish black, bloomy, 6–8 mm. across. Fls.VI–VII; fr.IX–X. B.M.8287(c). G.C.II.14:664. R.H.1877:176. B.C.5:2479. A.G.15:94(h). (*Ampelopsis t.* Sieb. & Zucc., *A. Veitchii robusta* Hort., *A. Hoggii* Hort., *A. japonica* Hort., *Vitis inconstans* Miq.—Japanese Ivy.) Japan, C. China. Intr. 1862. Zone V.—Var. **Veìtchii** Rehd. Lvs. smaller, crenate-serrate, purple while young, ovate and simple or 3-foliolate; lfts. with only 1–3 coarse teeth on each side, the lateral ones usually entire inside. B.H.27:224,t(c). R.H.1877:176. M.G.7:8(h). (*Ampelopsis V.* Hort.) The juvenile form.—Var. **purpúrea** Rehd. A form of the preceding with dark purple lvs. not changing to green. (*Ampelopsis Veitchii p.* and *atropurpurea* Hort.) Cult. 1889. —Var. **Lòwii** Rehd. Lvs. small, 2–3 cm. long, simple and often broader than long, incisely dentate and almost palmately lobed with very unequal teeth, or 3-foliolate, apple-green, purplish when young. Gn.71:516. A.F.30:1238. M.G.23:261. R.H.1917:272(h). (*A.L.*Hort.) Cult. 1908.—A popular vine, clinging firmly to walls and forming a dense cover; the lustrous foliage stands dust and smoke well and turns to a brilliant scarlet and orange in autumn.

A related species is **P. himalayàna** Planch. Lvs. 3-foliolate; lfts. 3, short-stalked, the middle one obovate to ovate or oblong-ovate, the lateral ones obliquely ovate and rounded or semicordate at base, coarsely serrate, glaucous and nearly glabrous beneath; cymes about as long as lf. Collett, Pl. Simla,f.31. S.H.2:f.211k(l). (*Vitis h.* Brandis, *V. semicordata* var. *h.* Hance, *Ampelopsis h.* Royle.) Himal. Cult. 1894. Zone VII?—Var. **rubrifòlia** Gagnep. Lfts. smaller and broader, purplish while young: cymes smaller. (*Vitis r.* Lév. & Vaniot.) W. China. Intr. 1907. Zone VII?—Closely related to the preceding is **P. semicordàta** Planch. Young shoots and lfts. beneath pilose; lfts. smaller. (*V. s.* Wall.) Himal. Intr. before 1914. Zone VII?

4. **TETRASTÍGMA** Planch. Evergreen or deciduous climbing shrubs: tendrils with adhesive tips or twining: lvs. alternate, digitate or pedate; lfts. 3–5, sometimes reduced to 1: fls. polygamo-dioecious, 4-merous, in axillary cymes or umbels; petals expanding; disk adnate to base of ovary; stigma sessile, 4-lobed or 4-parted: fr. 2–4-seeded; seeds ovoid-globose, sulcate on the ventral side. (Greek *tetra,* four, and *stigma;* referring to the 4-lobed stigma.) About 40 species in trop. and subtrop. Asia.

T. obtéctum Planch. Evergreen or half-evergreen climbing shrub with

disciferous tendrils; brts. pilose: lfts. long-petioled, digitate; lfts. 5, sessile, cuneate-obovate or elliptic, 1.5–3.5 cm. long, acute, remotely crenate-serrate with mucronate teeth, glabrous or pubescent (var. **pilòsum** Gagnep.) beneath: fls. greenish, small, in slender-stalked umbels; pedicels slender: fr. obovoid, 6 mm. long. Fl.VI–VIII; fr.X. (*Vitis obtecta* Wall.) Himal., C. and W. China. Intr. 1904? Zone VIII?

A related species is **T. serrulàtum** Planch. Glabrous: lvs. pedate; lfts. 5 or 3, ovate to elliptic-lanceolate, 1.5–6 cm. long, fls. in compound cymes: fr. globose, black. S.H.2:f.211b,212a-b. (*Vitis capreolata* Don, *Cissus serrulata* Roxb.) Himal. Cult. 1880. Zone VIII?

5. **COLUMÉLLA** Lour. Climbing shrubs, rarely herbaceous; tendrils usually branched: lvs. alternate, 3-foliolate or 5–9-foliolate and pedate, the lfts. stalked: fls. perfect, 4-merous, in axillary, corymbose or umbellate infl.; calyx indistinct; petals valvate, spreading; disk 4-lobed, small, thin, adnate to the ovary; style filiform: fr. 2–4-seeded; seed with 1 or 2 deep ventral grooves. (After Columella, Roman writer on agriculture; 1st century P. C.) Syn.: *Cayratia* Juss. About 16 species in E. and trop. Asia.

C. oligocárpa Rehd. To 3 m. long; young brts., petioles and peduncles finely grayish pubescent; tendrils forked: lvs. long-petioled, pedate; lfts. 5, the middle one on a petiolule 2–4 cm. long, elliptic-ovate, 6–15 cm. long, acuminate, cuneate, the lateral ones smaller and broader and on much shorter stalks, crenate-dentate with short and broad mucronulate teeth, glabrous or nearly so above except on midrib and veins, grayish pubescent on the veins beneath when young, membranous: peduncle 5–8 cm. long; corymb loose, 6–12 cm. across; anthers orbicular: fr. globose, 6–8 mm. across, yellow, finally black: seeds 3–4, with 2 deep ventral grooves. Fl.VI; fr.IX–X. (*V. o.* Lev. & Vaniot, *Cayratia o.* Gagnep., *Cissus o.* Bailey.) C. and S. China. Intr. 1907. Zone VII or VIII.

The related **C. japónica** Merr. (*Cissus j.* Willd.) is herbaceous; it has smaller and broader lfts., a rather dense infl. and elliptic-oblong anthers.

6. **CÍSSUS** L. Deciduous or evergreen shrubs climbing by tendrils, rarely herbs with usually tuberous roots; stems and lvs. more or less fleshy: lvs. alternate, simple or compound; lfts. sessile: fls. perfect or polygamo-monoecious, 4-merous, in usually umbel-like cymes, opposite the lf. or terminal; petals expanding; disk cupular, 4-lobed or of 4 distinct glands; style filiform, stigma small: fr. 1–2-seeded. (Greek *kissos*, ivy.) About 250 species in trop. and subtrop. countries.

C. incìsa Desmoul. MARINE IVY. Stem to 10 m., warty, fleshy; glabrous: lvs. 3-parted or 3-foliolate; lfts. or segments ovate or obovate, 1.5–2.5 cm. long, cuneate, coarsely dentate and often lobed: fls. in umbel-like peduncled cymes: fr. obovoid, about 8 mm. long, black, on recurved pedicels. Fl.VI–VIII; fr.X. B.B.2:210. (*Vitis i.* Nutt.) Mo. and Kans. to Ariz., Tex. and Fla. Intr. before 1876. Zone VII?

Fam. 62. TILIACEAE Juss. LINDEN FAMILY

Trees, shrubs or herbs, often with stellate or fascicled pubescence: lvs. alternate, rarely opposite, entire or lobed, stipulate: fls. perfect, regular; sepals 5, rarely 3 or 4, free or connate, usually valvate; petals as many, convolute, valvate or imbricate, rarely wanting; stamens 10 or usually more, hypogynous; filaments distinct or connate only at base; anthers 4-celled, opening by slits or pores; staminodes sometimes present; ovary superior, 2–10-celled; cells with 1 to several ovules; style 1, stigma radiate: fr. a caps. or indehiscent

and either nut-like or drupaceous, rarely a berry or separating into drupelets; seed albuminous.—About 35 genera and 300 species in trop., subtrop. and temp. regions.

A. Peduncle with a large adnate, usually oblong bract; ovary sessile; lvs. slender-petioled. 1. *Tilia*

AA. Peduncle without bract; ovary and stamens borne on a androgynophore: lvs. short-petioled. 2. *Grewia*

1. **TÍLIA** L. Linden. Deciduous trees, mostly with fascicled hairs; winter-buds large, obtuse, with few or several scales; terminal bud wanting: lvs. alternate, 2-ranked, slender-petioled, usually cordate or truncate and oblique at base, serrate; stipules caducous: fls. yellowish or whitish, in usually drooping cymes; peduncle adnate, usually about ½ to a large ligulate bract; sepals 5, distinct; petals 5, imbricate, often with a staminode opposite each petal; stamens many, distinct or in 5 fascicles opposite the petals; filaments often forked at apex; ovary 5-celled, the carpels opposite the sepals; cells 2-ovuled; style slender, with 5-lobed stigma: fr. globose or ovoid, nutlike, with usually 1–3 seeds; cotyledons palmately 5-lobed. (Ancient Latin name.) Lime-tree, Whitewood, Basswood. About 30 species in the temp. regions of the n. hemisphere, in N. Am. s. to Mex., but none in W. N. Am.; in Asia s. to C. China and S. Japan.

A. Lvs. glabrous beneath at maturity or pubescent with simple hairs.
B. Lvs. pubescent beneath and often above, rarely glabrescent: fls. usually 3, without staminodes. 1. *T. platyphyllos*
BB. Lvs. glabrous beneath except axillary tufts of hairs.
C. Fls. without staminodes.
D. Lvs. green or sometimes glaucescent beneath; tertiary veins prominent.
E. Lvs. lustrous and dark green above, serrate with slender-pointed teeth. 2. *T. euchlora*
EE. Lvs. dull green above, sometimes slightly glaucescent beneath, serrate with short acute teeth. 3. *T. vulgaris*
DD. Lvs. glaucous beneath; tertiary veins not prominent. 4. *T. cordata*
CC. Fls. with staminodes.
D. Lvs. glaucous or glaucescent beneath, 4–8 cm. long.
E. Lvs. closely serrate, not lobed. 5. *T. japonica*
EE. Lvs. coarsely serrate and usually 3-lobed. 6. *T. mongolica*
DD. Lvs. green or sometimes glaucescent beneath, 8–15 cm. long. 7. *T. glabra*
AA. Lvs. with fascicled or stellate, rarely simple pubescence beneath: fls. with staminodes.
B. Brts. and petioles glabrous.
C. Lvs. thinly grayish tomentose or grayish pubescent beneath, ovate or broad-ovate.
D. Lvs. without axillary tufts of hairs beneath, orbicular-ovate. 8. *T. Moltkei*
DD. Lvs. with axillary tufts of hairs, ovate. 9. *T. neglecta*
CC. Lvs. closely and densely tomentose.
D. Lvs. oblong-ovate or ovate, sharply serrate, 8–18 cm. long: fr. usually short-ellipsoid, smooth.
E. Petioles to 4 cm. long, tomentum of lf. often brownish; brts. slender. 10. *T. heterophylla*
EE. Petiole to 7 cm. long; tomentum of lf. always white; brts. stout. 11. *T. monticola*
DD. Lvs. orbicular-ovate, 5–10 cm. long, sinuately serrate: fr. globose, tuberculate. 12. *T. Oliveri*
BB. Brts. pubescent or tomentose, at least when young (or glabrate and lvs. denticulate); petioles pubescent.
C. Lvs. denticulate or with bristle-like teeth.
D. Lvs. white-tomentose, minutely denticulate, entire below the middle. 13. *T. tuan*
DD. Lvs. brownish-tomentose beneath, with bristle-like teeth. 14. *T. Henryana*
CC. Lvs. serrate.
D. Lvs. orbicular-ovate.
E. Tomentum white or grayish white, close: lvs. finely serrate.
F. Petiole shorter than half the blade: fr. slightly 5-angled: habit upright. 15. *T. tomentosa*
FF. Petiole longer than half the blade: fr. 5-furrowed; habit pendulous. 16. *T. petiolaris*
EE. Tomentum at least of young brts., petioles and veins beneath brownish: lvs. coarsely serrate with long-pointed teeth.
F. Lvs. without axillary tufts of hairs beneath. 17. *T. mandshurica*
FF. Lvs. with axillary tufts of hairs beneath. 18. *T. Maximowiczii*
DD. Lvs. triangular-ovate or ovate, coarsely and irregularly serrate with short-pointed teeth, often glabrescent with age. 19. *T. Miqueliana*

1. **T. platyphýllos** Scop. LARGE-LEAVED L. Tree to 40 m.; young brts. pubescent, rarely glabrous: lvs. roundish-ovate, 6–12 cm. long, abruptly acuminate, obliquely cordate, sharply and regularly serrate, dull and short-pubescent or glabrous above, light green and pubescent beneath, especially on the veins, rarely nearly glabrous; petiole pubescent 1.5–5 cm. long: fls. yellowish white, in pendent 3-, rarely 4–6-fld. cymes; floral bract 5–12 cm. long, pubescent on midrib below; stamens longer than petals; fr. subglobose to pyriform, 8–10 mm. long, tomentose, 5-ribbed, thick-shelled. Fl.VI; fr. IX–X. R.I.6:t.316–18(c). H.W.3:24,25(h),t.42(c). G.F.2:256. M.A.t.74 (h). M.D.1917:t.6(h). (*T. grandifolia* Ehrh., *T. europaea* L., in part.) Eu. Planted in Eu. since centuries.—A very variable tree with numerous spontaneous forms; the following are often cult.—Var. **laciniata** K. Koch. Smaller tree with deeply and irregularly lobed lvs., often cut to the midrib, with narrow divisions. S.H.2:f.253h-h^1. M.D.1920:67;1919:t.17(h). G.W.15:662 (h). (Var. *aspleniifolia* Kirchn., *T. europaea l.* Loud., *T. grandifolia filicifolia* Hort.)—Var. **rúbra** Rehd. Brts. red. (Var. *corallina* Hartw. & Ruempl.) —Var. **aûrea** Kirchn. Brts. bright yellow. (Var. *aurantia* Hort.)—Var. **pyramidàlis** Kirchn. Of narrow pyramidal habit. M.G.13:161(h).—Var. **vitifòlia** Simonkai. Lvs. slightly 3-lobed, less pubescent. R.I.6:t.319,f.5140 (c). M.D.1920:67. S.H.2:f.253e-f.—A handsome vigorous growing tree; the earliest Linden to bloom.

T. p. × *glabra* = **T. carlsruhénsis** Simonk. Lvs. slightly pilose on veins beneath, serrate with acute or subacuminate teeth, axils of secondary veins bearded; cymes 3-fld.; stamens as long as petals. S.H.2:f.254a-b,256e-f. (*T. praecox* A. Br., not Host.)—*T. p.* × *cordata* = *T. vulgaris;* see No. 3.

2. × **T. euchlòra** K. Koch. (?*T. cordata* × *dasystyla*). Tree to 20 m.; brts. often slightly pendulous, glabrous when young: lvs. roundish-ovate, 5–10 cm. long, abruptly short-acuminate, obliquely cordate, finely and sharply serrate, lustrous dark green and glabrous above, pale green and glabrous beneath, except axillary tufts of brown hairs; petiole glabrous, 3–5 cm. long: fls. 3–7, in pendulous cymes; floral bract linear-oblong, glabrous, 5–8 cm. long; style pubescent near base: fr. short-ellipsoidal, slightly 5-ribbed, tomentose. Fl.VII. S.H.2:f.252n-o. M.D.1920:67. (*T. dasystyla* Kirchn., not Stev., *T. rubra* var. *e.* Dipp.) Intr. about 1860. Zone V.—One of the handsomest Lindens, valued for its lustrous lvs. and good habit.

T. e. × *petiolaris* = *T. orbicularis;* see under No. 16.

T. dasýstyla Stev. resembles *T. euchlora.* Tree; brts. glabrous, red: lvs. broad-ovate, 8–15 cm. long, lustrous and glabrous above, with axillary tufts of whitish hairs beneath, rather coarsely serrate with aristate teeth: fls. 3–7; style glabrous or pubescent: fr. globose-obovoid, slightly angled. S.H.2:254e-f,255e. ?M.G.16: 381(h),382(h),540(h). (*T. multiflora* Ledeb., *T. caucasica* Rupr.) Cauc., W. Asia. Intr. ?—Forms of *T. platyphyllos* are sometimes cult. under this name.

3. × **T. vulgàris** Hayne. (*T. cordata* × *platyphyllos*). COMMON L. Tree to 40 m.; brts. glabrous: lvs. broad-ovate, 6–10 cm. long, short-acuminate, obliquely cordate or nearly truncate, sharply serrate, dark green and glabrous above, bright green beneath and glabrous except axillary tufts of hairs; petiole 3–5 cm. long; fls. 5–10 in pendulous cymes 7–8 cm. long: fr. subglobose or short-oval, faintly ribbed, tomentose, thick-shelled. Fl.VI–VII. H.A.3:t. 47(c). R.I.6:t.313. G.F.2:256. M.G.19:188(h),189(h). Am. For.21:782,t(h); 26:214(h). (*T. intermedia* DC., *T. europaea* L., in part.) Eu.—Var. **pállida** Sarg. Lvs. larger, yellowish or bluish green beneath. M.G.39:274(h). (*T. europaea* var. *p.* Wierzb.)—Much planted as a street tree and fine old trees are occasionally seen in this country.

4. **T. cordàta** Mill. SMALL-LEAVED L. Tree to 30 m.; young brts. glabrous

or slightly pubescent at first: lvs. suborbicular, 3–6 cm. long, sometimes broader than long, abruptly acuminate, cordate, sharply and rather finely serrate, dark green and glabrous and somewhat lustrous above, glaucous or glaucescent and glabrous beneath except axillary tufts of brown hairs; petiole slender, 1.5–3 cm. long: fls. yellowish white, fragrant, 5–7 in pendent or nearly upright cymes; stamens about as long as petals; floral bract 3.5–8 cm. long, glabrous: fr. globose, slightly or not ribbed, thin-shelled. Fl.VII. R.I.6:t.311, 312(c). H.W.3:21,22(h),t.41(c). G.F.2:257. M.G.1904:188(h). G.W.1914: 352(h);494(h). (*T. ulmifolia* Scop. *T. parvifolia* Ehrh., *T. microphylla* Vent., *T. silvestris* Desf., *T. europaea* L. in part.) Eu. Planted as shade tree since ancient times.—Var. **pyramidàlis** Wittm. Of narrow pyramidal habit. Gt. 48:180(h).—Var. **cândida** A. Henry. Lvs. white or nearly white. G.C.III. 68:180.

T. c. × *glabra* = **T. flavéscens** A. Br. Lvs. 6–8 cm. long, with rather coarse acuminate teeth, glabrous and green beneath; cymes many-fld.; staminodes partly present; stamens shorter than petals. S.H.2:252p-q(l).—Here belongs also *T. floribunda* A. Br. with longer and looser cymes, and *T. Spaethii* Spaeth with larger lvs.—*T. c.* × *dasystyla* = *T. euchlora;* see No. 2.

A related species is **T. amurénsis** Rupr. Bark thin, scaly: lvs. broad-ovate, coarsely serrate with acuminate teeth: fls. 3–20, sometimes with incompletely developed staminodes: fr. subglobose. N.K.12:t.7. S.H.2:f.250e-g. (*T. cordata* var. *mandshurica* Maxim., *T. Maximowiczii* Bak.) Manch., Korea. Cult. 1909. Zone V.

5. **T. japónica** Simonk. JAPANESE L. Tree to 20 m., similar to *T. cordata;* young brts. slightly pubescent at first: lvs. suborbicular, 5–8 cm. long, abruptly acuminate, cordate, sharply serrate, light bluish green and pubescent on the veins beneath when young, with axillary tufts of hairs; petiole 2.5–5 cm. long: fls. in 7–40-fld. pendulous cymes; bract stalked: fr. short-ellipsoidal, not ribbed, thin-shelled. Fl.VII. S.I.1:t.72(c). S.H.2:f.249i-l,250l-m. (*T. cordata* var. *j.* Miq.) Japan. Intr. 1886. Zone V.

Related species are: **T. insulàris** Nakai. Lvs. broad-ovate, 6–8 cm. long, coarsely serrate, with whitish axillary tufts beneath, thickish: cyme 4.5–7 cm. across; fls. 12–14 mm. across. N.T.12:43(b),t.10. Korea: Dagelet Isl. Intr. 1919. Zone V.—**T. paucicostàta** Maxim. Lvs. ovate, 5–8 cm. long, short-acuminate, obliquely truncate or subcordate at base, rather coarsely toothed, light or slightly bluish green beneath, with axillary tufts of hairs; cymes 7–15-fld.: fr. globose or pyriform, slightly ribbed. S.H.2:f.250n-o. N. and C. China. Intr. 1901. Zone V.—**T. kiusiàna** Mak. & Shiras. Lvs. oblong-ovate, 3–5 cm. long, obliquely rounded or subcordate at base, light green beneath, bearded in the axils; petiole 5–10 mm. long: fls. small, in 20–35-fld. pendulous cymes: fr. globose. S.I.2:t.50(c). Bull. Coll. Agric. Tokyo, 4,2:t.17. S.H.2:f.250a-b. Japan. Intr. ?

6. **T. mongòlica** Maxim. MONGOLIAN L. Tree to 10 m.; young brts. glabrous, reddish: lvs. reddish when unfolding, suborbicular to ovate, 4–7 cm. long, coarsely serrate and often 3-lobed, dark green and lustrous above, glaucescent and glabrous beneath except axillary tufts of hairs; petiole reddish, 2–3 cm. long: cyme 6–20-fld.; bract stalked: fr. subglobose, thick-walled. Fl.VII. S.T.1:t.61. R.H.1902:476–8. S.H.2:f.249g-h,250c-d. Mongolia, N. China. Intr. 1880. Zone V or IV.—Small graceful tree.

7. **T. glábra** Vent. AMERICAN L. Tree to 40 m.; brts. glabrous, green: lvs. broad-ovate, 10–20 cm. long, abruptly acuminate, cordate to truncate at base, coarsely serrate with long-pointed teeth, light green beneath, with tufts of hairs in the axils of the lateral veins, wanting at base; petiole 3–5 cm. long: fls. about 1.5 cm. across, in pendulous 6–15-fld. slender-branched cymes; floral bract usually stalked, tapering toward the base; stamens shorter than petals: fr. ellipsoid to subglobose, thick-shelled, without ribs. Fl.VII. G.O.t.45(c). S.S.1:t.24. Mn.6:153. F.L.5:136,t(h). M.G.31:357(h). (*T. americana* L.,

in part, *T. nigra* Borkh.) Can. to Va. and Ala., w. to N. D., Kans. and E. Tex. Intr. 1752. Zone IV.—Var. **macrophýlla** Schneid. Lvs. very large and broad, 12–20 cm. long. (*T. nigra* var. *m.* Bayer, *T. am.* f. *m.* V. Engl., *T. mississippiensis* Hort., in part, *T. laxiflora* Hort., in part.)—Var. **dentàta** Rehd. Lvs. large, coarsely and irregularly, often nearly doubly dentate. M.G.39:274(h). (*T. longifolia d.* Kirchn., *T. am.* f. *megalodonta* V. Engl.) —Var. **ampelophýlla** Rehd. Lvs. large, lobed and coarsely and irregularly toothed with acuminate teeth. (*T. am.* f. *a.* V. Engl., *T. inciso-dentata* Hort., *T. longifolia dentata* Hort., in part.)—Frequently planted as an avenue tree.

T. g. × *platyphyllos* = *T. carlsruhensis;* see under No. 1.—*T. g.* × *cordata* = *T. flavescens;* see under No. 4.—*T. g.* × *petiolaris* = *T. Moltkei;* see No. 8.

A closely related species is **T. floridàna** Small. Tree to 18 m. Lvs. tomentose or pubescent beneath when unfolding, soon glabrous, without or with very small axillary tufts and green or glaucescent beneath: fls. in pubescent few-fld. rather compact cymes; floral bract subsessile: fr. rusty-tomentose. S.M.738. S.H.2:f. 256i-k. N. C. to Fla., w. to Mo., Okla. and E. Tex. Intr. ?

8. × **T. Móltkei** Spaeth (*T. glabra* × *petiolaris*). Tree of vigorous growth with more or less pendent brs.; brts. glabrous or slightly pubescent at first; winter-buds glabrous or pubescent near apex: lvs. orbicular-ovate, 10–18 cm. long, similar to those of *T. glabra*, slightly grayish tomentose beneath, often pilose on veins, without axillary tufts; petiole 5–6 cm. long: cymes 5–8-fld., dense; pedicels tomentulose: fr. subglobose or depressed-globose and faintly furrowed. Fl.VII. E.H.7:t.407,f.11. S.H.2:f.256g(l). (*T. spectabilis* Dipp., not Host, *T. Blechiana* Hort., partly, *T. alba spectabilis* Hort.) Orig. before 1880.

9. **T. neglécta** Spach. Tree to 30 m.; brts. glabrous, red: lvs. broad-ovate or ovate, 10–20 cm. long, acuminate, obliquely cordate or truncate, coarsely serrate with apiculate teeth pointing forward, lustrous and glabrous above, short-pubescent with simple hairs beneath, often tinged brownish; petiole glabrous, 3–6 cm. long: cymes rather loose, 5–15-fld.; pedicels pubescent or nearly glabrous; bracts glabrous, usually decurrent nearly to base: fr. subglobose to ellipsoid, about 8 mm. across, rarely slightly angled. Fl.VII. S.M.740. (*T. Michauxii* Sarg., not Nutt., *T. nigra vestita* A. Br., *T. pubescens* Hort., not Vent.) Can. to N. C., w. to Minn. and Mo. Cult. 1830. Zone IV.

10. **T. heterophýlla** Vent. Large tree; brts. glabrous, reddish or yellowish brown: lvs. ovate, 8–13 cm. long, gradually acuminate, obliquely truncate or rarely subcordate at base, finely serrate with aristate teeth, glabrous above at maturity and lustrous, beneath with close thick white tomentum or often brownish on the upper lvs. and with small tufts of reddish brown hairs; petiole glabrous, 3–4 cm. long: cymes 10–20-fld., 6–8 cm. long, pubescent except the glabrous peduncle; bract tomentose beneath at first: fr. ellipsoid, 8 mm. long, apiculate, rusty-tomentose. Fl.VII. S.M.745. W.Va. to N. Fla., Ala. and Ind. Cult. 1755. Zone V.—Var. **Michaùxii** Sarg. Brts. red-brown: lvs. ovate to ovate-oblong, 8–15 cm. long, acute or abruptly acuminate, cordate or rarely obliquely truncate, coarsely serrate, with short white or grayish tomentum beneath; peduncle pubescent at first: fr. subglobose, 6–8 mm. across. (*T. M.* Nutt.) S.M.746. N. Y. to Ohio, Ind., Ark., Ala. and Ga. Cult. 1800. Zone V.—Handsome tree with large lvs. white beneath.

11. **T. montícola** Sarg. Tree to 20 m.; brts. glabrous, stout, usually bright red during the first year; winter-buds bloomy: lvs. ovate to ovate-oblong, 10–18 cm. long, gradually acuminate, obliquely truncate or cordate, finely serrate with straight or incurved teeth, dark green and lustrous above, densely white-tomentose beneath, thin: petiole 3–7 cm. long, glabrous: fls. 8–10 mm.

long, in usually 7–10-fld. glabrous cymes; pedicels sparingly pubescent: fr. ellipsoid, 6–8 mm. long, rusty-tomentose. Fl.VII. S.M.747. (*T. heterophylla* Sarg., in part, not Vent.) Mts. of Va., Tenn. and N. C. Cult. 1888. Zone V.

12. **T. Olíveri** Szyszyl. Tree to 15 m.; young brts. glabrous, reddish brown: lvs. broad-ovate or orbicular-ovate, 7–10 cm. long, short-acuminate, obliquely cordate or truncate at base, sinuately denticulate with short gland-tipped teeth, dark green and glabrous above, white-tomentose beneath without axillary tufts; petiole glabrous, 3–5 cm. long: fls. small, in pendulous 7–20-fld. cymes; pedicels short, thickened; floral bract sessile: fr. globose, apiculate, about 8 mm. long, warty, thick-shelled. Fl.VI. R.H.1924:188. S.H.2:f.259 a-b(l). (*T. pendula* Engl.) C. China. Intr. 1900. Zone V.

13. **T. tuan** Szysz. Tree to 15 m.; brts. glabrous or pubescent at first: lvs. broad-ovate to ovate, 6–13 cm. long, acuminate, obliquely truncate or subcordate, remotely and minutely denticulate, usually entire below the middle, glabrous above, densely gray-tomentose beneath, with small axillary tufts; petiole pubescent, 3–6 cm. long: fls. in 15–20-fld. cymes; floral bract stellate-pubescent: fr. subglobose, about 8 mm. across, warty, thick-shelled. Fl.VII. H.I.20:1926. C.C.245. S.H.2:f.259f-g(l). C. China. Intr. 1901.—Var. **chinénsis** Rehd. & Wils. Brts. tomentose; winter-buds densely pubescent: lvs. ovate to oblong-ovate. Intr. 1907.

14. **T. Henryàna** Szysz. Tree to 15 m.; brts. stellate-pubescent at first, soon glabrous: lvs. broad-ovate to ovate, 5–12 cm. long, short-acuminate, obliquely cordate or truncate, denticulate with bristly teeth, midrib and veins pubescent above, brownish tomentose beneath with axillary tufts of hairs; petiole 2–4 cm. long, pubescent: fls. whitish, 20 or more in pendulous cymes; floral bract stellate-pubescent: fr. short-ellipsoid, 5-ribbed. Fl.VII–VIII. H.I.20:1927. S.H.2:f.259d-e(l). C. China. Intr. 1901. Zone V.

15. **T. tomentòsa** Moench. SILVER L. Tree to 30 m., with upright brs.; young brts. tomentose: lvs. suborbicular, 5–10 cm. long, abruptly acuminate, cordate to nearly truncate at base, sharply and sometimes doubly serrate or even slightly lobulate, dark green and slightly pubescent above at first, white-tomentose beneath; petiole 2–3.5 cm. long, tomentose: fls. 7–10 in pendulous cymes: fr. ovoid, 8–10 mm. long, minutely warty and slightly 5-angled. Fl. VII–VIII. R.I.6:t.324(c). H.W.3:26,t.43(c). F.E.14:1154,t(h). M.G.19:189 (h). E.H.7:t.373(h). (*T. alba* Ait., *T. argentea* DC., *T. alba pyramidalis* Hort.) S. E. Eu., W. Asia. Intr. 1767. Zone V.—Handsome tree of broad-pyramidal habit.

16. **T. petiolàris** Hook. f. PENDENT SILVER L. Tree to 25 m., with pendent brs.; young brts. tomentose: lvs. orbicular-ovate, 5–11 cm. long, acuminate, obliquely cordate or nearly truncate at base, regularly and sharply serrate, slightly pubescent above, white-tomentose beneath; petiole 3–6 cm. long: fls. whitish, 3–10, in pendulous tomentose cymes: fr. depressed-globose, 8 mm. across, warty and with 5 grooves. Fl.VII. B.M.6737(c). B.S.2:595. G.C.III.66:131. Gg.15:291(h). E.H.7:t.374(h). Gn.86:579(h). (*T. tomentosa* var. *p.* Kirchn., *T. alba* K. Koch., not Michx., *T. americana pendula* Hort.) Doubtfully native in S. W. Eu. and W. Asia. Intr. before 1840. Zone V.—Handsome tree of pendent habit.

T. p. × *euchlora* = **T. orbiculàris** Jouin. Brs. pendulous: lvs. lustrous and glabrous above, grayish tomentose beneath; petiole shorter. S.H.2:f.252l-m(l). Gn.89: 731(h). Orig. about 1870.—*T. p.* × *glabra* = *T. Moltkei;* see No. 8.

17. **T. mandshùrica** Rupr. & Maxim. MANCHURIAN L. Tree to 20 m.; young brts. and buds with brownish tomentum: lvs. orbicular-ovate, 8–15

cm. long, short-acuminate, usually cordate at base, coarsely serrate with long-pointed teeth, sometimes indistinctly lobed, sparingly pubescent above, grayish or whitish tomentose beneath, without axillary tufts; petiole 3–7 cm. long, tomentose: fls. 7–10 in pendulous brownish tomentose cymes: fr. globose, 5-ribbed toward the base or indistinctly ribbed. Fl.VI–VII. N.K.12:t.12. S.H.2:f.257i-k(l). N. E. Asia. Intr. about 1860. Zone V or IV?

18. **T. Maximowicziàna** Shiras. Tree to 30 m.; young brts. tomentose: lvs. orbicular-ovate or broad-ovate, 8–14 cm. long, abruptly acuminate, obliquely cordate, coarsely serrate with broad mucronate teeth, dark green and slightly pubescent above at first, grayish tomentose beneath and with brownish axillary tufts, finally often partly glabrescent; petiole 3–7 cm. long: fls. small, 10–18 in pendulous tomentose cymes; style exserted: fr. subglobose, 5-ribbed, about 1 cm. across. Fl.VI. S.I.2:t.50(c). G.F.6:113 (as *T. Miqueliana*). B.C.6:3348. Bull. Coll. Agr. Tokyo,4,2:t.18. (*T. Miyabei* Jack.) Japan. Cult. 1880. Zone V.

A related species is **T. intónsa** Wils. Tree to 20 m.; young brts. pilose: lvs. broad-ovate, 8–14 cm. long, abruptly acuminate, sharply and rather finely serrate, grayish green and stellate-pubescent beneath, usually with axillary tufts: cymes pilose, 1–3-fld.: fr. ovoid, 5-angled. (*T. tonsura* Veitch.) W. China. Intr. 1903.

19. **T. Miqueliàna** Maxim. Tree to 15 m.; young brts. tomentulose: lvs. ovate or triangular-ovate, 6–8, on shoots to 12 cm. long, usually much longer than broad, acute or acuminate, obliquely cordate at base, coarsely serrate with broad mucronate teeth, dark green and glabrous or nearly so above, grayish tomentose beneath, without axillary tufts of hairs; petiole 2–4 cm. long, tomentose: fls. 10–20 in pendulous tomentose cymes; stamens 60–75; style shorter than petals: fr. subglobose, 5-ribbed at base. Fl.VI. S.I.1:t. 72(c). S.H.2:f.258a-b. Cult. in Japan; native country unknown. Cult. in Eu. 1900. Zone V.

2. **GRÈWIA** L. Trees or shrubs, more or less stellate-pubescent; winter-buds small with several pointed narrow scales: lvs. alternate, 2-ranked, short-petioled and usually oblique, entire or serrate, stipulate: fls. 5-merous, rather small, solitary or in terminal or lateral cymes; petals glandular and usually ciliate at base, rarely very small or wanting; stamens many, distinct; anthers suborbicular; ovary 5-celled, with 2 to several ovules in each cell: fr. a drupe with 1 or several stones, fleshy or sometimes fibrous; seeds with copious albumen. ‡(After Nehemiah Grew, who wrote on the anatomy of plants; 1628–82.) About 90 species in trop. and subtrop. regions of Asia, Afr. and Austral.

G. parviflòra Bge. Shrub to 2.5 m.; brts. tomentose: lvs. ovate to rhombic-ovate, 5–12 cm. long, acuminate, subcordate to broad-cuneate, 3-nerved at base, unequally and doubly serrate and sometimes slightly 3-lobed, scabrous above, densely stellate-pubescent beneath; petiole 6–15 mm. long: fls. creamy yellow, about 1 cm. across in 5–8-fld. umbels on a stalk 2–8 mm. long opposite the lf.: fr. orange to red, 1-seeded and subglobose, about 6 mm. across, or 2–4-seeded and 2–4-lobed and 8–12 mm. across. Fl.VII–VIII; fr.X. I.T.1: t.12. K.D.409. Gt.38:601. N.K.12:t.16. N. China, Korea. Intr. 1883. Zone (V).—Var. **glabréscens** Rehd. & Wils. Brts. and lvs. glabrescent. N. and C. China. Cult. 1890.

Rarely cult. is **G. oppositifòlia** Buch.-Ham. Small tree: lvs. ovate, 6–10 cm. long, rounded at base, crenate-serrate, stellate-tomentulose: petiole 4–8 mm. long: fls. about 3 cm. across, on a peduncle 1.5–3 cm. long. Wight, Icon. Pl.1:t.32. N. W. Himal. Cult. 1914.

Fam. 63. **MALVACEAE** Neck. MALLOW FAMILY

Herbs, shrubs or trees, usually with stellate pubescence: lvs. alternate, simple, usually palmately veined and more or less lobed, stipulate: fls. perfect, regular, rarely unisexual, solitary or in compound infl.; sepals 5, often united, valvate, often with bractlets at base; petals 5, convolute, often adnate to the stamens; stamens numerous, very rarely 5, the filaments united into a tube; anthers 1-celled; pollen spiny; ovary superior, 2–many-celled; ovules 1–many in each cell; styles and stigmas usually as many as carpels: fr. a caps. or separating into carpels, very rarely fleshy; seed with scant albumen; embryo usually curved with leafy folded cotyledons.—About 40 genera and 900 species in the temp. and trop. regions over the whole earth.

1. **HIBÍSCUS** L. Herbs or deciduous or evergreen shrubs, rarely small trees; winter-buds (of our species) minute, covered by the lf.-basis: lvs. alternate, palmately veined and lobed: fls. usually solitary and axillary, mostly large and conspicuous; calyx 5-toothed or 5-parted, usually with an involucel of bractlets below; corolla usually campanulate, of 5 distinct petals; staminal column with numerous anthers below the 5-toothed apex; style 5-cleft at apex with usually capitate stigmas; ovary 5-celled, with 3–many ovules in each cell: caps. loculicidally dehiscent into 5 valves; the cells sometimes with horizontal walls. (Ancient Latin name.) About 200 species mostly in the Tropics.

H. syríacus L. Shrubby Althaea. Shrub to 3 or occasionally small tree to 5 or 6 m.; young brts. villous, later glabrous: lvs. ovate or rhombic-ovate, 5–10 cm. long, more or less 3-lobed and coarsely toothed with rounded or acutish teeth, broad-cuneate or rounded at base and 3-nerved, glabrous except a few hairs on the veins beneath; petiole 5–15 mm. long: fls. solitary, short-stalked, white to red or purple or violet, broad-campanulate, 6–10 cm. across; calyx with unequal ovate-lanceolate lobes and an involucel of linear bractlets shorter than calyx. Fl.VIII–IX. B.M.83(c). Gn.52:504,t(c). R.B. 3:25,t(c). F.E.25:459(h);32:127(h). G.W.13:65(h). (*Althaea frutex* Hort.) China, India. Intr. before 1600. Zone V or VI.—Numerous garden forms of which may be mentioned: "Totus albus." Pure white, single. G.C.II.10:524. Gn.52:504(c).—"Coelestis." Purplish blue. F.P.1879:t.495 (c).—"Speciosus." Fls. double, pinkish, striped and blotched deep rose. R.H.1845:133,t(c).—"Variegatus." Fls. double, purple: lvs. variegated. B. H.18:277,t.(c).—"Puniceus." Red, double.—"Monstrosus." White with dark purple centre.—"Grandiflorus superbus." Rosy, single.—"Pulcherrimus." Pink and white, double.—"Admiral Dewey." Pure white, double.—"Hamabo." Pale blush with large carmine blotch at base of each petal.—Ornamental shrub with showy fls. valued for its late flowering season.

Fam. 64. **STERCULIACEAE** Schott & Endl. STERCULIA FAMILY

Trees, shrubs or herbs, sometimes climbing: lvs. alternate, simple or digitate, stipulate: fls. perfect or unisexual, usually regular; sepals 3–5, valvate, more or less connate; petals convolute or reduced or wanting; stamens in 2 whorls, those opposite the sepals reduced to staminodes or wanting; the anthers united into a tube and variously arranged, 2-celled; ovary superior, sessile or on a androgynophore, 4–5-celled; cells with 2–many ovules; styles 4–5, distinct or connate: fr. usually dry, often separating into carpels; seeds albuminous. About 50 genera and 750 species in the Tropics, few extratropical.

FIRMIÀNA Marsigli. Deciduous trees: lvs. alternate simple, palmately lobed: fls. 5-merous, unisexual, in terminal panicles; sepals colored, petals wanting; androgynophore developed; carpels 5, distinct at base, connate at apex into a single style; rudimentary and free in the staminate fls.: fr. consisting of leathery follicles opening long before maturity and leaf-like; seeds globular, on the edge near the base. (After Karl Joseph von Firmian, governor of Lombardy; 1718–82.) About 10 species in Asia, 1 in Africa.

F. símplex W. F. Wight. PHOENIX-TREE. Round-headed tree to 15 m., with smooth gray-green bark: lvs. palmately 3–5-lobed, 16–20 cm. long, cordate, lobes acuminate, entire, glabrous or tomentulose beneath; petiole about as long as blade: fls. yellowish green, in terminal panicles 25–50 cm. long; sepals narrow-oblong, about 1 cm. long: carpels 4–5, 3–10 cm. long. Fl.VII; fr.XI. E.N.III.6,f.49(fr). Cavanilles, Diss. 5:t.149. L.A.1:363. (*F. platanifolia* R. Br., *Sterculia p.* L.) China, Japan. Intr. 1757. Zone VIII.—Ornamental tree planted for its large lvs.

Fremóntia califórnica Nutt. is probably not hardy within our area; it is a shrub or small tree with small obtusely 3–5-lobed lvs. stellate-tomentose beneath, and with conspicuous yellow fls. B.M.5591(c). R.H.1867:90,t.(c). S.S.1:t.23. Gn.29:8, t(c). Calif. Intr. 1851.

Fam. 65. DILLENIACEAE R. Br. DILLENIA FAMILY

Trees or shrubs, often climbing, rarely herbs: lvs. alternate, very rarely opposite, simple; stipules usually wanting: fls. perfect or polygamous, regular, hypogynous, in cymes or solitary; sepals 5, or fewer, sometimes many, imbricate, persistent; petals 5, rarely 2–7, imbricate, deciduous; stamens numerous, free or united into fascicles, rarely less than 10; carpels several, rarely 1, united or distinct; ovules numerous: fr. a follicle, berry or caps. or enclosed in a fleshy calyx; seeds albuminous, usually arillate.—About 12 genera with 200 species chiefly trop.

A. Stamens numerous; styles numerous, radiating.....1. *Actinidia*
AA. Stamens 10; style 1.....2. *Clematoclethra*

1. **ACTINÍDIA** Lindl. Deciduous twining shrubs; winter-buds very small, enclosed in the swollen base of the petiole: lvs. alternate, long-stalked, serrate, rarely entire, exstipulate: fls. dioecious or polygamous, in axillary cymes or solitary, cup-shaped, white or rarely reddish; sepals 5, rarely less, imbricate; petals 5, rarely 4, convolute, thin; stamens numerous; anthers versatile: ovary superior, many-celled; styles many, radiating: fr. a berry with numerous small albuminous seeds; embryo comparatively large. (Greek *actis* ray, referring to the radiating styles.) Syn. *Trochostigma* Sieb. & Zucc. About 25 species in Asia from Saghalin to Java and Himal.

A. Brts. glabrous or nearly so: lvs. glabrous or pubescent only on the veins beneath.
B. Anthers dark purple: lvs. dark green and lustrous above.
C. Lvs. green beneath, often bristly on the veins.....1. *A. arguta*
CC. Lvs. glaucous beneath, glabrous.....2. *A. melanandra*
BB. Anthers yellow.
C. Lvs. firm, never colored: fr. spotted.....3. *A. callosa*
CC. Lvs. thin, often partly colored: fr. not spotted.
D. Pith of brs. solid, white: lvs. partly white or yellow.....4. *A. polygama*
DD. Pith of brs. lamellate: lvs. partly pink or white.....5. *A. kolomikta*
AA. Brts. densely hairy; lvs. tomentose beneath.....6. *A. chinensis*

1. **A. argùta** Miq. High climbing: brs. with brown lamellate pith: lvs. broad-ovate to elliptic, 8–12 cm. long, abruptly acuminate, rounded to subcordate at base, rarely cuneate, setosely and sharply serrate, green beneath and usually setose on midrib; petiole 3.5–8 cm. long, sometimes setose: infl. glabrous, shorter than petiole: fls. 3 or more, about 2 cm. across; sepals

elliptic-oblong; petals brownish at base: fr. ellipsoid, about 2.5 cm. long, greenish yellow, edible. Fl.VI–VII; fr.IX–X. B.M.7497(c). L.I.t.25. R.H. 1874:395,f.54. M.G.13:378(h). H.B.2:582(h). (*A. volubilis* Carr., not Miq., *A. rufa* Miq., *A. polygama* Hort., not Miq.) Japan, Korea, Manch. Cult. 1874. Zone V.—Var. **cordifòlia** Dunn. Lvs. broad-ovate, cordate at base, more setose on veins beneath; petiole purple.—Vigorous growing vine, forming a dense covering for arbors, etc.

A related species is **A. purpúrea** Rehd. Lvs. elliptic to elliptic-oblong, 8–12 cm. long, with appressed teeth, dull above, green and glabrous beneath or tomentose at midrib; petiole 3–5 cm. long: pistillate fls. usually solitary, about 1.5 cm. across; sepals ovate: fr. ovoid to oblong, 2–2.5 cm. long, rostrate, purple, sweet. W. China. Intr. 1908. Zone VI?

2. **A. melanándra** Franch. High climbing; brts. glabrous, with lamellate pith: lvs. elliptic to oblong, 6–9 cm. long, abruptly acuminate, rounded or cuneate, appressed-serrulate, glaucous beneath and glabrous except axillary tufts of hairs; petiole 2–3.5 cm. long: fls. white, 2–2.5 cm. across, pistillate solitary, staminate several; infl. glabrous, about as long as petiole; ovary bottle-shaped, glabrous: fr. 2.5–3 cm. long, ellipsoid. Fl.VI–VII: fr.IX–X. Japan, C. China. Intr. about 1900. Zone V.

3. **A. callòsa** Lindl. Climbing to 7 m.; brts. with conspicuous lenticels; pith lamellate: lvs. elliptic to oblong, 8–12 cm. long, acuminate, cuneate to rounded, setosely serrulate, glabrous and green beneath; petiole 3–5 cm. long: fls. white or yellow, fragrant, 1.5–2 cm. across, on slender glabrous pedicels; ovary pubescent: fr. oblong-ovoid, greenish or russet, spotted. S.H.2:f.216(l). Himal., S. China. Intr.?—Var. **Hénryi** Maxim. Lvs. broad-elliptic to elliptic-ovate or oblong-ovate, 5–10 cm. long, sometimes subcordate, bearded in the axils of the veins beneath: infl. usually much shorter than petiole. Fl.VI; fr.X. C. and W. China. Intr. 1907. Zone VI or VII.

A closely related species is **A. venòsa** Rehd. Climbing to 8 m.; brs. with white lamellate pith: lvs. elliptic to oblong-ovate, 8–15 cm. long, usually rounded at base, tomentulose on the veins beneath at first, later nearly glabrous; the lateral veins connected by conspicuous parallel veinlets: fls. buff-yellow: fr. ovoid or subglobose, spotted. W. China. Intr. 1908. Zone VI?—Another related species is **A. coriàcea** Dunn. Pith solid, white: lvs. subcoriaceous, oblong to lance-oblong, 6–10 cm. long, cuneate, remotely serrate, glabrous: fls. small, reddish: fr. ovoid, spotted. W. China. Intr. 1908 (distributed as *A. Henryi*).

4. **A. polýgama** Maxim. SILVER-VINE. Climbing to 5 m.: lvs. broad-ovate to ovate-oblong, 8–14 cm. long, acuminate, rounded or subcordate at base, appressed-serrate, usually setose on the veins beneath, in part of the lvs. of the staminate plant the upper half or sometimes nearly the whole lf. silvery white or yellowish; petioles bristly: fls. 1–3, white, 1.5 cm. across, fragrant; ovary glabrous, bottle-shaped: fr. yellow, ovoid, beaked, 2–3 cm. long, edible. Fl.VI; fr.IX–X. Ito & Kaku, Fig. Pl. Koishik. Bot. Gard.2:t. 20(c). S.H.2:f.216f-g,217a-f. (*A. volubilis* Miq.) Manch. to Japan and C. China. Intr. about 1886. Zone V or IV.—The staminate plant is very handsome with its partly silvery white lvs. The plant attracts cats.

5. **A. kolomíkta** Maxim. KOLOMIKTA-VINE. Climbing usually to 2, rarely to 5 or 7 m.: lvs. ovate-oblong, 10–12 cm. long, acuminate, rounded or cordate at base, unequally setose-serrate, pubescent on the veins beneath when young, part of the lvs., particularly in the staminate plant, with a large white to pink blotch at the apex extending often to the middle or sometimes beyond: fls. 1–3, white, 1.5 cm. across, fragrant; ovary cylindric, glabrous: fr. oblong-ovoid, 2–2.5 cm. long, greenish or yellowish, sweet. Fl.V; fr.IX–X. R.H.1898:36,t.(c). S.H.2:f.216d-e. M.G.11:397(h). G.W.3:61(h). N. E. Asia to Japan and C. and W. China. Intr. about 1855. Zone V or IV.—

The staminate plant is strikingly handsome with its lvs. blotched pink and white.

A related species is **A. tetrámera** Maxim. Lvs. narrower and smaller, glabrous except axillary tufts of hairs or rarely setose on the midrib: fls. smaller, tetramerous: fr. yellow. C. and W. China. Intr. ?

6. **A. chinénsis** Planch. Climbing to 8 m.: brs. with shaggy hairs red when young: pith lamellate: lvs. orbicular or oval, 8–12 cm. long, cordate at base, rounded or emarginate or on shoots acuminate, ciliate-serrulate, finally glabrous above and dark green, whitish tomentose beneath with reddish hairs on the veins: fls. several, 3–4 cm. across, creamy-white, changing to buff-yellow: fr. ovoid to subglobose, 3–5 cm. long, hairy, edible. Fl.VI; fr.VIII–IX. B.M.8538(c). G.C.III.46:77,79,t. H.I.16:1593. U.S.Inv.50:t. U.S.Im.111-112:t;164:t. China. Intr. 1900. Zone VII or VIII.—The handsomest of the Actinidias, with large fls. and large frs. similar in flavor to gooseberries.

2. **CLEMATOCLÉTHRA** Maxim. Deciduous climbing shrubs; brs. with solid pith; winter-buds conspicuous, with imbricate scales: lvs. alternate, petioled, usually serrate, exstipulate: fls. perfect, in axillary cymes, sometimes solitary, white; sepals 5, imbricate, persistent; petals 5, imbricate; stamens 10, short; ovary 5-celled; cells with about 10 ovules; style cylindric, slender: fr. berry-like, with thin flesh, usually 5-seeded. (*Clematis* and *clethra;* referring to the climbing habit and the similarity of the fl. to that of Clethra.) About 10 species in C. and W. Asia.

C. lasiŏclada Maxim. Climbing to 6 m.; young brts. pubescent: lvs. ovate, 5–10 cm. long, acuminate, rounded or subcordate at base, setose-denticulate, glabrous except pubescent on the midrib above and villous along the midrib beneath and sometimes along the veins, or glabrous except axillary tufts of hairs, light or pale green beneath; petiole 2–6 cm. long: fls. 1.2–1.5 cm. across, in 2–7-fld. peduncled cymes, shorter than petiole; sepals orbicular-ovate, puberulous like the pedicels and peduncles or nearly glabrous: fr. globose, black, about 8 mm. across. Fl.VII; fr.IX–X. E.N. ed. 2,21:46. W. China. Intr. 1908. Zone VI?

Related species are: **C. scandens** Maxim. Brts. setose: lvs. oblong-ovate to oblong, 5–10 cm. long, rounded or broad-cuneate at base, minutely denticulate, pubescent beneath and hispid on veins; petiole 1–4 cm. long, usually hispid: fl.-clusters usually about as long as petiole. W. China. Intr. 1911.—**C. integrifŏlia** Maxim. Brts. glabrous or nearly so: lvs. ovate to ovate-oblong, 3.5–7 cm. long, rounded at base, setose-denticulate, glaucous and glabrous beneath; petiole 2–4.5 cm. long: fls. solitary or in few-fld. clusters much shorter than petioles. N. W. China. Intr. 1908.—**C. actinidioïdes** Maxim. Brts. glabrous: lvs. ovate to ovate-oblong, 4–8 cm. long, rounded to subcordate at base, minutely serrulate, light green and glabrous beneath; petiole 2.5–5 cm. long: fls. long-stalked, often solitary. W. China. Intr. 1908.

Fam. 66. EUCRYPHIACEAE Gay. EUCRYPHIA FAMILY

Evergreen trees or shrubs: lvs. opposite, simple or pinnate; stipules connate: fls. perfect, large, white, axillary; sepals 4, imbricate, cohering at apex and separating at base at anthesis; petals 4, large, convolute; stamens very numerous, surrounded at base by tubular excrescences, inserted on the elongated floral axis below the 5–18-celled ovary; cells with several pendulous ovules: fr. a dehiscent caps., separating into 5–18 carpels opening at the inner suture; seeds winged, albuminous.—One genus with 4 species in Chile and Australia.

EUCRÝPHIA Cav. Characters of the family. (Name from Greek *eu*, well, and *kryphios*, covered.)

E. glutinòsa Focke. Evergreen or half-evergreen tree to 5 m., with upright brs. pubescent when young: lvs. pinnate, clustered at the end of the brs.; petiole about 1 cm. long; lfts. 3–5, the lateral ones sessile, elliptic to ovate, 3–6 cm. long, lustrous and dark green above, pubescent when young: fls. 1 or 2, at end of brts., 5–6 cm. across; anthers yellow; fr. pear-shaped, about 1.5 cm. long. Fl.VII–VIII. B.M.7067(c). G.C.III.10:217;15:109(h); 30:351(h). Gn.86:563. B.S.1:536. (*E. pinnatifolia* Gay.) Chile. Intr. 1859. Zone VII or VIII.—Handsome shrub with large white fls. in summer; requires soil free of lime.

Fam. 67. THEACEAE Mirb. TEA FAMILY

Deciduous or evergreen trees or shrubs: lvs. alternate, simple, entire or serrate, estipulate: fls. usually perfect, regular, axillary or subterminal, usually solitary; sepals 5–7, rarely many, imbricate, usually persistent; petals 5, rarely 4 or more, distinct or connate at base; stamens very many, rarely 5, 10 or 15; free or united at base, often adnate to the petals; ovary superior, 2–10-celled; cells with 1 to many ovules; styles as many as carpels or connate into 1: fr. a loculicidal caps. or indehiscent and dry or drupaceous; seeds 1 to many; albumen wanting or scanty; embryo usually curved. Syn.: *Ternstroemiaceae* R. Br.—About 16 genera and 180 species in trop. and subtrop., few in temp. regions.

A. Lvs. evergreen: seeds large, subglobose.....1. *Thea*
AA. Lvs. deciduous; seeds flattened, often winged.
B. Fr. with persistent central axis: sepals very unequal, roundish.....2. *Gordonia*
BB. Fr. without central axis; sepals nearly equal.....3. *Stewartia*

1. THÉA L. Evergreen trees or shrubs; winter-buds with many imbricate scales: lvs. alternate, short-petioled, serrulate: fls. perfect, axillary, solitary, rarely 2 or 3, white to red; sepals 5 to many, imbricate; petals 5–7, slightly connate at base; stamens numerous, the outer ones connate and partly adnate to the petals at base, the inner ones free; ovary 3–5-celled; ovules 4–6 in each cell; styles filiform, connate below: fr. a loculicidal woody caps. with a persistent central axis; seeds few, subglobose; embryo straight with thick cotyledons. (The latinized Chinese name of the Tea plant.) Syn.: *Camellia* L. About 45 species in trop. and subtrop. Asia.

A. Sepals many, deciduous: fls. 7–12 cm. across. (Sect. CAMELLIA Szysz.).....1. *T. japonica*
AA. Sepals 5, persistent: fls. about 3.5 cm. across, white. (Sect. EUTHEA Szysz.)
2. *T. cuspidata*

1. T. japónica Nois. CAMELLIA. Shrub or tree to 15 m., glabrous: lvs. ovate to elliptic, 5–10 cm. long, acuminate, lustrous dark green above: fls. subsessile, red in the typical form; petals 5–7, roundish; ovary glabrous; seeds subglobose or angular, 2–2.5 cm. across. Fl.IV–VI; fr.IX–X. B.M.42(c). S.Z.1:t.82(c). F.S.20:t.2121(c). S.I.1:t.73(c). Gn.28:203;36:247. (*Camellia j.* L.) China, Japan. Cult. 1742. Zone VIII?—Ornamental evergreen tree or shrub with large lustrous lvs. and large fls. varying from white to red; many garden forms with single or double fls. Only precariously hardy within our area like the two following species.

A related species is **T. sasánqua** Nois. Shrub of loose habit; young brts. pubescent: lvs. elliptic to oblong-ovate, 4–8 cm. long, bluntly acuminate, crenate-serrate, hairy on the midrib above; fls. 3.5–5 cm. across, white; petals obovate to oblong; ovary pubescent. S.Z.1:t.83(c). S.I.2:t.52(c). Gn.54:142;t(c);82:33, 106. (*Camellia s.* Thunb.) China, Japan. Intr. 1811. Zone VIII.—Several garden forms with white to deep rose, single or double fls.

2. **T. cuspidàta** Kochs. Shrub to 2 m.; young brts. puberulous: lvs. elliptic to ovate-lanceolate, 5–8 cm. long, long-acuminate, rounded or cuneate, indistinctly denticulate, lustrous dark green above or sometimes purplish green, paler and minutely dotted beneath; petiole 3–4 mm. long, slightly pubescent: fls. solitary, white, 3–4 cm. across, on a short pedicel clothed with imbricate green bracts; petals usually 6; ovary glabrous. Fl.v–vi. G.C.III.51:261. J.L.38:62,f.38. B.S.1:285. (*Camellia c.* Veitch.) China. Intr. 1901. Zone VII? or VIII.

2. **GORDÒNIA** Ellis. Deciduous or evergreen shrubs or trees; winter-buds elongated, naked, pubescent: lvs. alternate, petioled, entire or serrate: fls. perfect, axillary, solitary, large, white; sepals 5, unequal, rounded, persistent; petals free or slightly united, usually obovate; stamens numerous, connate at base and adnate to petals; ovary 3–6-celled; cells with 4 to many ovules; style slender, with a 3–6-lobed stigma: fr. a loculicidally dehiscent woody caps. with a persistent axis; seeds flat, usually winged above. (After James Gordon, a well-known English nurseryman; 1728–91.) About 30 species in trop. and subtrop. Asia and 2 in N. Am.

G. alatamàha Sarg. FRANKLINIA. Shrub or tree to 10 m., with upright brs.; bark smooth, thin; young brts. silky: lvs. obovate-oblong, 12–15 cm. long, acute, gradually narrowed into a short petiole, remotely serrate, bright green and shining above, pubescent below: fls. short-stalked, cup-shaped, 7–8 cm. across; petals roundish-obovate, concave, crenulate: fr. globose, 1.5–2 cm. across; seeds wingless. Fl.ix–x; fr.x. S.S.1:t.22. Mn.6:201. M.G.14:25. Gng.7:167(h). Gn.M.40:167(h). (*G. pubescens* L'Hérit., *Franklinia a.* Marsh.) Ga. Intr. 1770, but not found wild again since 1790. Zone (V) or VI.—Handsome ornamental tree with large lvs. turning crimson in autumn; chiefly valued for its large late appearing fls.

Probably not hardy within our area is **G. Lasiánthus** Ellis. LOBLOLLY BAY. Evergreen tree to 25 m.: lvs. 10–12 cm. long, crenate-dentate, glabrous: fls. 5–6 cm. across, long-stalked; petals oblong-obovate: fr. ovoid, pointed. Fl.vii–viii. B.M.668(c). S.S.1:t.21. I.T.2:t.41. Va. to Fla. and Miss. Intr. 1768.

3. **STEWÁRTIA** L. Deciduous shrubs or trees with smooth flaky bark; winter-buds with several imbricate scales, usually silky; lvs. alternate, short-petioled, serrate: fls. perfect, solitary, axillary or subterminal, cup-shaped, with 1 or 2 bracts below the calyx; sepals and petals 5 or sometimes 6; petals obovate to roundish, crenulate, silky outside, connate at base; stamens numerous, adnate at base to the petals; ovary superior, 5-celled; styles 5, free or connate: fr. a woody caps. loculicidally dehiscent into 5 valves; seeds compressed, 1–4 in each cell, usually narrowly winged. (After John Stuart, Earl of Bute, a patron of botany; 1713–92.) Syn.: *Stuartia* L'Hérit. About 6 species in E. N. Am. and E. Asia.

A. Styles united: petals always 5: lvs. cuneate at base.
  B. Stamens purple: capsule depressed-globose, slightly apiculate.....1. *S. malacodendron*
  BB. Stamens with whitish filaments: capsule pointed .....2. *S. pseudocamellia*
AA. Styles distinct; petals often 6: lvs. usually rounded at base.....3. *S. pentagyna*

1. **S. malacodéndron** L. Shrub to 4 m.; young brts. pubescent: lvs. short-petioled, elliptic to elliptic-oblong, 6–10 cm. long, acute or short-acuminate, cuneate, serrulate and ciliate, light green and pubescent beneath; petioles 2–5 mm. long, pubescent: fls. 8–10 cm. across; petals obovate, spreading; style shorter than stamens; anthers bluish: fr. about 1.5 cm. across; seeds wingless, lustrous. Fl.vi–viii. B.M.8145(c). R.H.1878:70,t(c). Gn. 14:136,t(c);34:280. G.C.III.77:399,t. B.S.2:553. (*S. virginica* Cav.) Va. and

Ark. to Fla. and La. Cult. 1752. Zone VII.—Handsome shrub with showy fls.

2. **S. pseudo-camélli**a Maxim. Shrub or tree to 20 m., with upright brs.; bark red, peeling off in large flakes; brts. glabrous, slender: lvs. elliptic or obovate-elliptic to elliptic-lanceolate, 3–8 cm. long, acuminate, cuneate, remote-serrulate, bright green, light green and glabrous or with scattered long hairs beneath, thickish; petiole 4–10 mm. long: fls. hemispherical, 5–6 cm. across, with small bracts below calyx, axillary near base of brts. on peduncles 1.5–3.5 cm. long; petals suborbicular, concave; stamens white, connate at base; anthers orange; pedicels 5–30 mm. long: fr. ovoid, 5-angled, about 2 cm. long; seeds narrowly winged, dull. Fl.VII–VIII; fr.X–XI. B.M. 7045(c). S.I.1:t.73(c). R.H.1879:430,t(c). Gn.43:172,t(c). G.F.9:35. G.C. III.60:217. S.L.401(h). (*S. grandiflora* Briot, *S. japonica* var. *grandiflora* Hort.) Japan. Cult. 1874. Zone V.—Handsome tree with large white fls. in summer.

Related species are: **S. koreàna** Nakai. Tree to 15 m.; brts. glabrous: lvs. elliptic to broad-elliptic, 6–10 cm. long, broad-cuneate, remotely and obscurely serrulate, slightly pubescent beneath: fls. near end of brts., sometimes terminal. Korea. Intr. 1918. Zone V.—**S. sinénsis** Rehd. & Wils. Shrub or tree to 10 m.; young brts. pilose: lvs. elliptic-obovate to oblong-elliptic, 5–10 cm. long, acuminate, serrulate, glabrous or sparingly pubescent beneath: fls. short-stalked, 5 cm. across, with large serrulate or entire bracts exceeding the calyx; stamens united at base for about ¼; ovary pubescent: fr. subglobose, pointed, 2 cm. across, pilose or glabrescent. B.M.8778(c). C. China. Intr. 1901. Zone VI?—**S. monadélpha** Sieb. & Zucc. Tree to 25 m.; brts. pilose: lvs. elliptic to oblong-elliptic, acute, remotely serrulate, 4–6 cm. long, pubescent beneath: fls. 3.5 cm. across, with 2 large bracts; petals obovate, flat; filaments united below; anthers violet: fr. ovoid, slightly angled, about 1 cm. long, appressed-pubescent. S.Z.1:t.96(c). Japan. Intr. 1916. Zone VI?—**S. serràta** Maxim. Young brts. pilose: lvs. elliptic to obovate, 4–7 cm. long, serrate with incurved teeth, pilose on midrib and in the axils of the veins beneath: fls. short-stalked, 5–6 cm. across, with large bracts at base; filaments free: ovary glabrous: fr. ovoid, 2 cm. long. B.M.8771(c). Japan. Cult. 1917. Zone VI?

3. **S. pentágyna** L'Hérit. Shrub to 5 m.; brts. glabrous: lvs. ovate or elliptic to ovate-oblong, 6–12 cm. long, acuminate, usually rounded at base, remotely serrulate, sparingly pubescent and grayish green beneath; petiole 3–15 mm. long: fls. cup-shaped, 6–7 cm. across; petals obovate, often 6, concave; stamens white, with orange anthers: fr. ovoid, 1.5–2 cm. long, sharply 5-angled, pointed, pubescent; seeds narrowly winged. Fl.VII–VIII; fr.IX–X. B.M.3918(c). B.R.1104(c). Gr.G.2:t.139. M.G.15:479. Gn.89:468. (*Malachodendron pentagynum* Dum.-Cours., *M. ovatum* Cav.) N. C. and Tenn. to Fla. Cult. 1800? Zone V.—Var. **grandiflòra** Bean. Fls. 8–10 cm. across, stamens purple. Ga. Cult. 1914.—Handsome shrub with beautiful large fls. particularly those of the var., and with bright green lvs. changing to orange and scarlet in autumn.

Fam. 68. GUTTIFERAE Choisy. GARCINIA FAMILY

Trees or shrubs, rarely herbs, with oil-glands or oil-ducts: lvs. opposite or whorled, rarely alternate; stipules usually wanting: fls. perfect, polygamous or dioecious, solitary or in cymes; sepals 4–5, imbricate; petals as many, imbricate or convolute; stamens usually many and fascicled, rarely few; ovary superior, of 3–5, rarely fewer or more carpels and with as many cells or 1-celled; styles distinct or united; ovules usually many and on parietal placentae: fr. a capsule, drupe or berry-like; seed without albumen. Including *Hypericaceae*.—More than 40 genera and about 650 species chiefly in the Tropics and some in temp. regions.

A. Fls. 4-merous.....1. *Ascyrum*
AA. Fls. 5-merous.....2. *Hypericum*

1. **ÁSCYRUM** L. St. Peter's-wort. Low subshrubs with 2-edged brts., glabrous: lvs. opposite, sessile, entire, pellucid-dotted, exstipulate: fls. yellow, 4-merous, in terminal, usually 3-fld. cymes; sepals nearly equal or the 2 outer larger; stamens many, slightly or not united at base; ovary 1-celled, with 2–3, rarely 4 parietal placentae; ovules many; styles distinct or connate at base: fr. a septicidal caps.; seeds not winged. (Ancient Greek name of a plant, probably Hypericum.) Five species in N. and C. Am. and Himal.

A. hypericoïdes L. St. Andrew's Cross. Much-branched, erect or decumbent shrub, to 80 cm. long: lvs. numerous, oblong or obovate-oblong to oblanceolate or linear, 1–3.5 cm. long, obtuse or acutish, fls. about 1.5 cm. across; outer sepals ovate or oblong-ovate, inner lanceolate, much smaller; petals narrow-oblong, as long as outer sepals; styles 2, very short; capsule flat. Fl.VI–IX. Mn.3:65,t(c). G.F.5:257. B.C.1:405. B.B.2:528. (*A. crux-Andreae* L., *A. multicaule* Michx.) Mass. and Ill. to C. Am. and W. Ind. Intr. 1759. Zone V.—Low short-lived subshrub with bright yellow fls.

A related species is **A. stans** Michx. Upright shrub to 80 cm., with 2-edged or 2-winged brts.: lvs. oblong to obovate, 1–4 cm. long, partially clasping: fls. 2.5–4 cm. broad; outer sepals broad-oval or suborbicular, the inner lanceolate, shorter; petals obovate; styles 3–4. G.G.1:t.91. B.B.2:528. L.I. to Pa., Fla. and Tenn. Intr. 1816. Zone VI.

HYPERÌCUM L. St. John's-wort. Herbs or shrubs, sometimes evergreen: lvs. opposite, sometimes whorled, short-petioled or sessile, entire, dotted with pellucid glands, exstipulate: fls. perfect, in terminal or axillary cymes or solitary, yellow, rarely pink or purplish; sepals 5, imbricate or valvate, petals 5, oblique, convolute; stamens usually numerous, distinct or in 3 or 5 bundles, rarely as few as 3: ovary 1–5-celled, with 3–5 parietal placentae; styles 3–5, distinct or connate: fr. a septicidal caps., rarely berry-like; seeds cylindric. (Ancient Greek plant name of obscure meaning.) About 200 species in the temp. and subtrop. regions of the n. hemisphere, few in the s. hemisphere.—Ornamental usually low shrubs or subshrubs chiefly planted for their showy yellow fls.

A. Styles 5.
B. Lvs. ovate to ovate-lanceolate: fls. 2.5–7 cm. across; stamens in 5 fascicles.
C. Fls. about 7 cm. across, usually solitary: low suffruticose stoloniferous plant. 1. *H. calycinum*
CC. Fls. 3–6 cm. across: plants shrubby.
D. Styles distinct.
E. Sepals ovate; petals roundish or obovate.
F. Brts. 2-edged.....2. *H. patulum*
FF. Brts. terete.....3. *H. Hookerianum*
EE. Sepals linear-lanceolate; petals oblong.....4. *H. lysimachioides*
DD. Styles connate, 1.5–2 cm. long.....5. *H. chinense*
BB. Lvs. linear-oblong to lanceolate: fls. 8–25 mm. across; stamens free.
C. Cymes many-fld.; fls. about 1 cm. across.....6. *H. lobocarpum*
CC. Cymes few-fld.; fls. 1.5–2.5 cm. across.....7. *H. Kalmianum*
AA. Styles 3.
B. Styles more or less united; stamens distinct, shorter than petals.
C. Fls. in axillary, few-fld. cymes forming narrow leafy panicles.
D. Lvs. narrowly linear, 1–4 cm. long: ovary incompletely 3-celled.....8. *H. galioides*
DD. Lvs. narrow-oblong, 2–8 cm. long: ovary completely 3-celled.....9. *H. prolificum*
CC. Fls. terminal, solitary or in cymes.
D. Sepals foliaceous: fls. 1–3, 2.5–5 cm. across: ovary incompletely 3-celled. 10. *H. aureum*
DD. Sepals not foliaceous: fls. smaller.
E. Lvs. short-petioled: ovary completely 3-celled.
F. Fls. many, in large terminal corymbs: upright shrub.....11. *H. densiflorum*
FF. Fls. solitary or few: decumbent shrub.....12. *H. Buckleyi*
EE. Lvs. sessile; ovary incompletely 3-celled.
F. Lvs. linear to narrow-oblong; stem 2-edged.....13. *H. cistifolium*
FF. Lvs. ovate to oblong; stem quadrangular.....14. *H. nudiflorum*

BB. Styles free; stamens in 3 or 5 fascicles.
C. Lvs. opposite, sessile; stamens about as long as petals.
D. Fr. a caps.; style longer than ovary.
E. Sepals deciduous; style as long as stamens: lvs. of disagreeable goat-like odor when bruised.....15. *H. hircinum*
EE. Sepals persistent; styles longer than stamens: lvs. of aromatic odor.
16. *H. elatum*
DD. Fr. a berry: style shorter than ovary.....17. *H. Androsaemum*
CC. Lvs. whorled; stamens shorter than petals.....18. *H. Coris*

1. **H. calýcinum** L. ROSE OF SHARON. Evergreen or half-evergreen subshrub, to 30 cm., stoloniferous, with procumbent or ascending 4-angled stems: lvs. short-petioled, ovate-oblong to oblong, 5–10 cm. long, obtuse, dark green above, glaucous beneath, subcoriaceous: fls. solitary, rarely 2 or 3, 7–8 cm. across, bright yellow; sepals large, broad-obovate; stamens in 5 clusters; anthers red; style shorter than stamens, divergent. Fl.VII–IX. B.M. 46(c). G.25:333. G.W.1:197. B.C.3:1630. Gn.87:458(h). S. E. Eu., Asia Minor. Intr. 1676. Zone (V), VI.—Low plant with large and showy yellow fls., valued as a ground cover, particularly in sandy soil.

H. c. × *patulum* = *H. Moserianum;* see under No. 2.

2. **H. pátulum** Thunb. Half-evergreen or evergreen spreading shrub, to 1 m.: brts. arching, 2-edged, usually purplish: lvs. ovate-oblong to ovate-lanceolate, 3–6 cm. long, acutish, glaucous beneath: fls. solitary or in cymes, 4–5 cm. across, golden yellow; sepals orbicular-ovate, about ½ as long as petals; petals roundish, overlapping; styles upright, as long or slightly shorter than stamens. Fl.VII–IX. B.M.5693(c). R.H.1875:170,t(c). Gt.15:513. Gn. W.21:95. Japan. Intr. 1862. Zone VII.—Var. **oblongifòlium** Koehne. Lvs. 5–10 cm. long, acutish, bluish gray beneath: fls. 3–4 cm. across; sepals less than half as long as petals. (*H. o.* Wall.) Himal.—Var. **ùralum** Koehne. Lvs. 2–3 cm. long, acute or acutish: fls. 2–2.5 cm. across; sepals less than half as long as petals. G.C.III.78:329(h). (*H. u.* Don, *H. nepalense* Hort.) Himal.—Var. **Hénryi** Veitch. More vigorous: lvs. ovate to ovate-oblong, 5–7 cm. long: infl. larger; fls. 5–6 cm. across; sepals ovate, acute. China. Intr. 1898. Zone (V), VI.—Var. **Forréstii** Chittenden. Similar to var. *Henryi*, but fls. larger. J.L.48:f.26. S. W. China. Cult. 1922.—Handsome free-flowering shrub with golden-yellow fls.

H. p. × *calycinum* = **H. Moseriànum** André. Shrub to 40 cm.: stems reddish, arching: lvs. ovate, 4–5 cm. long, obtuse and mucronulate: fls. 1–5, 5–6 cm. across, golden-yellow, with broad petals. R.H.1889:464. Gn.54:409,t(c). R.B.16:97. G.C.III.10:333. Orig. about 1887. Zone VII?—Var. **trícolor** Mauméné. Lvs. variegated with white and edged red: fls. smaller. J.8:186. Orig. about 1893.

3. **H. Hookeriànum** Wight & Arn. Evergreen or half-evergreen compact shrub, to 2 m.: brts. reddish brown, terete: lvs. subsessile, ovate to ovate-oblong, 3–8 cm. long, obtuse or acutish, dark blue-green above, glaucous beneath: fls. cup-shaped, 5 cm. across, in several-fld. clusters; sepals large, obovate, obtuse; petals broad-obovate; stamens scarcely half as long as petals; styles recurved at apex, slightly longer than stamens: caps. broad-ovoid, furrowed. Fl.VIII–IX. B.M.4949(c). Gn.54:490. G.3:463. (*H. oblongifolium* Hook.) Sikkim, W. China. Intr. before 1853. Zone VIII.—Var. **Leschenaùltii** Choisy. Sepals acute. G.C.III.74:143. Himal., Java.—Very handsome and showy.

4. **H. lysimachioìdes** Wall. Half-evergreen shrub to 1 m., with slender spreading brs.; brts. angled: lvs. ovate to ovate-oblong, 2–3.5 cm. long, acute, glaucous beneath: fls. about 3 cm. across, yellow, in loose leafy cymes; sepals linear-lanceolate; petals oblong; stamens very numerous, about as long as petals; styles upright, shorter than stamens. Fl.VIII–IX. V.F.25. Himal. Intr. 1894. Zone VI–VII.

Related species are: **H. cérnuum** Roxb. Brts. terete: lvs. narrow-elliptic to ovate-lanceolate, 3–7 cm. long: fls. pale yellow, 5 cm. across, long-stalked, nodding, solitary or in 3–5-fld. cymes; petals obovate; stamens little shorter than petals; styles slender, nearly as long as stamens. (*H. oblongifolium* Choisy.) Himal. Intr. about 1910. Zone VII or VIII.—**H. reptans** Hook. f. & Thoms. Prostrate shrub: lvs. elliptic-oblong, 6–12 mm. long: fls. solitary, about 4 cm. across. Gn.24:267;30:221. Himal. Cult. 1883. Zone VIII?—Sometimes confused with *H. repens* L., a perennial with smaller narrower lvs. and smaller fls. with 3 styles. S.F.8:t.775(c).

5. **H. chinénse** L. Half-evergreen shrub to 60 cm.; brts. terete: lvs. sessile, oblong or narrow-oblong, 4–8 cm. long, obtuse: fls. solitary or in 3–7-fld. cymes, bright yellow, 4–6 cm. across; sepals ovate to elliptic-ovate or oblong-ovate, obtuse or acutish; the longer stamens as long as petals; style 1.5–2 cm. long, 5-cleft at apex. Fl.VI–IX. B.M.334(c). G.C.III.1:705. S.H.2:f.224a. (*H. monogynum* Willd., *H. salicifolium* Sieb. & Zucc.) China, Japan. Intr. 1753. Zone VIII.

6. **H. lobocárpum** Gattinger. Upright shrub to 2 m.; brts. angled: lvs. sessile or short-petioled, narrow-oblong to oblanceolate, 3–7 cm. long, obtuse or mucronulate, revolute at the margin: fls. 1–1.5 cm. broad, numerous, in dense cymes forming a terminal corymb or panicle; sepals oblong, obtusish; petals cuneate: capsule 5-lobed, 5–7 mm. long. Fl.VIII–IX. G.F.10:453. S.H.2:f.223b-c. N. C. and Tenn. Intr. before 1898. Zone V.

H. l. × *galiodes* = **H. arnoldiànum** Rehd. Infl. a cylindric panicle; fr. 3–5-celled. Orig. 1904.—*H. l.* × *prolificum* = **H. Dawsoniànum** Rehd. Similar to *H. prolificum*, but differs in the many-fld. infl. and in the 3–5-celled lobed caps. Orig. 1893.

A closely related species is **H. oklahomênse** E. J. Palmer. Lvs. narrower, firmer, with conspicuous fascicles of smaller lvs.: infl. looser; fls. about 2 cm. across; petals oblong-obovate, about as long as stamens and style: caps. deeply lobed, sharply ridged. Okla. Intr. 1924.

7. **H. Kalmiànum** L. Shrub to 1 m.; stems 4-angled; brts. 2-angled: lvs. linear-oblong to oblanceolate, 2.5–5 cm. long, bluish green above, glaucous beneath: fls. 1.5–2.5 cm. across, bright yellow, in 3-fld. cymes; sepals foliaceous, oblong, acute; stamens about half as long as petals; styles united below, slightly longer than stamens: fr. ovoid, 6–10 mm. across, beaked. Fl.VIII. B.M.8491(c). G.F.3:113. M.M.6:t.8(c). Que. and Ont. to Mich. and Ill. Intr. 1760. Zone IV.—Handsome hardy species.

H. K. × *densiflorum* = **H. nôthum** Rehd. Fls. more numerous, smaller; sepals narrower; fr. 3–5-celled. Orig. 1903.

8. **H. galioides** Lam. Subshrub to 1 m., with slender stems; brts. nearly terete or 2-edged; lvs. sessile, linear-oblanceolate, 1–5 cm. long, with axillary clusters of smaller lvs., acute, with recurved margin, dark green and conspicuously dotted above: fls. 1–1.5 cm. across, in terminal and axillary few-fld. cymes forming narrow leafy panicles; sepals linear or linear-spatulate, nearly as long as petals; petals cuneate: fr. conic-ovoid, 5–6 mm. long, furrowed. Fl.VII–IX. G.F.10:433. G.C.III.24:301. Del. to Ga., Mo. and Tex. Intr. 1790. Zone V.

H. g. × *lobocarpum* = *H. arnoldianum;* see under No. 6.

Related species are: **H. fasciculàtum** Lam. Shrub to 1.5 m.; brts. sharply 4-angled; lvs. of axillary clusters nearly as long as main pair, subulate, 5–20 mm. long, thick: sepals nearly as long as petals. N. C. to Fla. and Tex. Intr. 1811. Zone VIII?—**H. aspalathoides** Willd. Shrub to 80 cm.; brts. sharply angled: lvs. partly clustered, linear or subulate, 5–8 mm. long: sepals about half as long as petals. N. C. to Fla. and La. Intr. ?

9. **H. prolíficum** L. Shrub with exfoliating light brown bark and rather stout upright brs., to 1.5 m. tall; brts. 2-edged: lvs. short-petioled, narrow-oblong to oblanceolate, 3–8 cm. long, obtuse, dark lustrous green above and

pellucid-punctate: fls. about 2 cm. across, bright yellow, in terminal and axillary few- to several-fld. cymes; styles united at base: caps. oblong, 1–1.5 cm. long, not furrowed. Fl.VII–IX. G.F.3:526. W.D.2:t.88(c). (*H. foliosum* Jacq., *Myriandra prolifica* Spach.) N. J. to Iowa and Ga. Intr. about 1750. Zone V.—Often cult.; the most vigorous of the hardier cult. species.

H. p. × *lobocarpum* = *H. Dawsonianum;* see under No. 6.

10. **H. aûreum** Bartr. Upright shrub with rather stout brs., to 1 m. tall, often with a single stem, with thin exfoliating reddish bark; brts. 2-edged: lvs. ovate-oblong to oblong, 2.5–6 cm. long, mucronate, bluish green above, glaucous beneath, pellucid-dotted: fls. terminal, 1 or few, sessile or subsessile, 3–5 cm. across, bright yellow; sepals obovate, unequal, much shorter than the broad-obovate petals; stamens very numerous; fr. ovoid, about 1 cm. long, not furrowed. Fl.VII–VIII. B.M.8498(c). G.F.2:185. B.C. 3:1631. Gn.W.20:934. (*H. prolificum* var. *a.* Gray.) S. C. and Tenn. to Ga. and Tex. Intr. 1880. Zone V.—Handsome dense shrub with large bright fls.

A closely related species is **H. spléndens** Small. Lvs. oblong, 2–4 cm. long: fls. stalked, in several-fld. cymes; stamens orange: caps. with 3 narrow wings. Ga. Intr. 1906. Zone VI or VII.

11. **H. nudiflòrum** Michx. Upright shrub or subshrub, to 1 m.; brts. 4-angled: lvs. elliptic-oblong to oblong-lanceolate, 2–6 cm. long, obtuse, flat, thin: fls. light yellow, 1.5–2 cm. across, in loose dichotomous cymes on a leafless peduncle; sepals elliptic-oblong to elliptic-oblanceolate, 3–4 mm. long: fr. conic-ovoid, 6–7 mm. long. Fl.VII–VIII. N. C. to Fla. and Ala. Cult. 1897. Zone (V), VI.

12. **H. cistifòlium** Lam. Stoloniferous subshrub, to 1 m.; stems 4-angled: lvs. narrow-oblong to linear-lanceolate, 2–8 cm. long, obtuse or acutish, often slightly clasping, revolute: fls. 1–1.5 cm. across, nearly sessile, in loose dichotomous cymes; sepals ovate to lanceolate, acute; petals cuneate at base: fr. subglobose to globose-ovoid, 4–6 mm. long, 1-celled. Fl.VII–IX. B.B.2:532. (*H. sphaerocarpum* Michx.) Ohio to Ill., Ala. and Ark. Intr. 1880. Zone V.—Of little ornamental value, but may be used as a sand-binding plant.

Related species are: **H. túrgidum** Small. Shrub to 60 cm.: lvs. linear to linear-oblanceolate, 1–2.5 cm. long, acute, revolute: fls. about 1 cm. across, in several-fld. cymes; sepals ovate to elliptic: caps. subglobose, broadest above the middle, abruptly pointed, 3.5 mm. across. Ala. Intr. 1907. Zone VI or VII?—**H. glomerâtum** Small. Shrub to 1 m.: lvs. narrow-oblong to linear-oblong, 2–4 cm. long, apiculate: fls. 2–2.5 cm. across, in dense cymes; sepals narrow-oblong: caps. incompletely 3-celled. N. C. Intr. before 1905. Zone VI or VII.—**H. adprèssum** Bartr. Subshrub with upright stems or ascending from a creeping base, to 50 cm.: lvs. narrow-oblong to lanceolate, 2–6 cm. long: fls. 1–1.5 cm. across, in terminal cymes; sepals lanceolate or ovate-lanceolate: fr. ovoid, 5–6 mm. long, slender-beaked. B.B.2:531. (*H. fastigiatum* Ell.) Mass. to Ga. and La. Intr. 1888. Zone V.

13. **H. densiflòrum** Pursh. Upright shrub to 2 m.; brts. 2-edged: lvs. linear-oblong to linear, 1–5 cm. long, acute, revolute: fls. 1–1.5 cm. across, in dense many-fld. corymbs; sepals unequal, oblong to elliptic-oblong: caps. ovoid, 4–6 mm. long, slightly 3-lobed. Fl.VII–IX. G.F.3:527. R.H.1899:517, 518. M.M.4:t.7(c). (*H. prolificum* var. *d.* Gray.) N. J. to Fla., Mo. and Tex. Intr. 1889. Zone V.

14. **H. Buckleyi** M. A. Curtis. Subshrub with decumbent or ascending stems, to 30 cm. high; stems 4-angled: lvs. obovate to elliptic, 5–20 mm. long, rounded at apex: fls. 2–2.5 cm. across, 1–3, terminal; sepals obovate or spatulate, about half as long as the narrow-obovate thin petals; styles con-

nate: caps. conic-ovoid, 6–10 mm. long. Fl.VI–VII. G.F.4:581. N. C. to Ga. Intr. 1889. Zone V.—Adapted for rockeries and as ground-cover.

15. **H. hircînum** L. Half-evergreen subshrub of round compact habit, to 1 m.; brts. 2-edged: lvs. ovate to ovate-lanceolate, 2.5–6 cm. long, acute to obtuse, of goat-like odor when crushed: fls. about 3 cm. across, bright yellow, solitary or in 3-fld. cymes; sepals lanceolate, deciduous, about ⅓ or ¼ the length of the petals; stamens much longer than petals; caps. ovoid, pointed, 6 mm. long. Fl.VII–IX. W.D.2:t.86(c). Mediterr. region. Intr. 1640. Zone VI or VII.—Var. **pùmilum** Wats. Shrub to 30 cm. high, of dwarf compact habit: lvs. smaller. W.D.2:t.87(c). (Var. *minor* Lav.)

A related species is **H. inodòrum** Willd. Slender-branched shrub, to 1.5 m., without goat-like odor: lvs. rather crowded, oblong-ovate, 2.5–5 cm. long, obtuse: fls. 2–2.5 cm. across, one or few; sepals lanceolate, about ½ as long as the narrow petals; stamens little longer than petals. Jaub. & Spach, Ill.1:t.38. S.H.2:224b. S. E. Eu., Cauc. Cult. 1870.—Here may be mentioned **H. olýmpicum** L. Subshrub, 15–30 cm. high, with little-branched stems; brts. slightly 2-edged or nearly terete: lvs. sessile, elliptic-oblong to oblong, 1–3 cm. long, acutish, grayish green: fls. 1–5, yellow, about 5 cm. across; sepals ovate, acute; stamens in 3 bundles, slightly shorter than the oblong-obovate petals; styles 3, longer than the stamens. B.M. 1867(c). S.F.8:t.772(c). S. E. Eu., Asia Minor. Intr. 1706. Zone VIII?

16. **H. elàtum** Ait. Half-evergreen shrub, to 1.5 m.; brts. slightly 2-edged: lvs. ovate to ovate-oblong, 3–8 cm. long, obtuse or acutish, often subcordate at base, bluish green beneath, of aromatic odor when bruised: fls. 2–3 cm. across, in several- to many-fld. terminal panicles; sepals ovate to ovate-lanceolate, reflexed in fr.; styles longer than stamens: fr. ovoid, pointed. Fl.VII–VIII. R.I.6:t.352(c). S.H.2:f.225d-e. Webb & Berthelot, Fl. Canar. 2:t.85(c). (*H. grandifolium* Choisy, *Androsaemum Webbianum* Spach.) Canary Isls., Madeira. Intr. 1762 and sometimes escaped from cult. Zone VII–VIII.—The typical Canary Island plant differs in its more reticulate lvs. and in the larger fls. from the cult. form which may be *H. elatum* × *Androsaemum.* (*H. multiflorum* Hort., not H.B.K.)

17. **H. Androsaèmum** L. Tutsan. Half-evergreen shrub, to 1 m.; brts. 2-edged: lvs. ovate to ovate-oblong, 5–10 cm. long, obtuse, cordate or subcordate at base, whitish beneath, slightly aromatic: fls. 2–2.5 cm. across, light yellow, in 3–9-fld. cymes or solitary; sepals ovate, about 1 cm. long, little shorter than the petals; styles short, recurved, persistent: fr. berry-like, subglobose, about 8 mm. across, purple-black. Fl.VI–IX. R.I.6:t.352(c). F.D.21:2094(c). S.H.2:f.225a-c. (*Androsaemum officinale* All.—Sweet Amber.) W. and S. Eu., W. Asia. Intr. in the 17th century. Zone VI or VII.

18. **H. Côris** L. Upright or sometimes procumbent subshrub, to 60 cm.; brts. terete: lvs. in whorls of 4–6, linear, 1–2 cm. long, revolute: fls. 2 cm. across, golden-yellow, in terminal panicles; sepals glandular-denticulate, scarcely ⅓ as long as petals, upright in fr. Fl.VII–VIII. B.M.6563(c). R.I. 6:t.351(c). F.D.21:t.2106(c). S. Eu. Cult. 1640. Zone VII?

A closely related species is **H. empetrifòlium** Willd. Shrubby; brts. slightly angled: lvs. in whorls of 3, 8–16 mm. long; panicle many-fld.; sepals ⅓–¼ as long as petals, spreading in fr. B.M.6764(c). S. E. Eu., W. Asia. Intr. 1788. Zone VIII?

Fam. 69. TAMARICACEAE Desv. TAMARISK FAMILY

Shrubs or small trees, rarely herbs: lvs. alternate, sessile, often scale-like or needle-shaped, estipulate: fls. regular, perfect, solitary or in spikes; sepals 4–5; petals as many, imbricate; stamens 4 to many, inserted on a disk: ovary superior, 1-celled, with 3–5 parietal placentas; ovules 2 to many; styles 3–5 or stigma sessile: fr. a 1-celled or incompletely 3–4-celled capsule; seeds

bearded, rarely winged, with or without albumen; embryo straight; cotyledons flat.—Four genera with about 100 species from Eu. and the Mediterr. region to E. Asia and India.—Besides the 2 genera described below *Reaumuria hypericoides* Willd. from W. Asia and *Hololachne songarica* Ehrenb. from Songaria have been occasionally introduced into botanic gardens, but hardly ever successfully cult.

A. Stamens free; styles present; seeds with sessile tuft of hairs.....1. *Tamarix*
AA. Stamens connate, about ½; stigma sessile; seeds with stalked tuft of hairs..2. *Myricaria*

1. **TÁMARIX** L. Tamarisk. Deciduous shrubs or trees, with very slender terete brs.; the ultimate small brts. falling with the lvs.: lvs. small, usually scale-like, often sheathing: fls. small, short-pediceled or sessile, in dense racemes usually collected in terminal panicles; sepals and petals 4–5; stamens 4–5, rarely 8–12, distinct or slightly connate at base; anthers extrorse: ovary 1-celled, surrounded at base by a more or less deeply lobed disk; styles 2–5, clavate or short and thick: fr. a caps. dehiscent into 3–5 valves; seeds many, minute, with a sessile tuft of hairs at apex. (Ancient Latin name of the plant.) About 75 species in W. Eu. and from the Mediterr. region to E. Asia and India.—Cult. chiefly for their feathery foliage and the profusely produced pink or pinkish fls. in spring or summer; also used as sand-binding plants.

A. Racemes lateral on last year's brs.
B. Fls. 4-merous, their bracts about as long as pedicels, obtusish; anthers mucronate.
1. *T. parviflora*
BB. Fls. 5-merous, their bracts longer than pedicels, acuminate.....2. *T. juniperina*
AA. Racemes in large terminal panicles, rarely lateral on the brs. of the current year; fls. 5-merous.
B. Brts. and lvs. finely pubescent: disk of fls. 5-lobed, the lobes narrowed into the filaments.
3. *T. hispida*
BB. Brts. and lvs. glabrous.
C. Petals deciduous: filaments inserted on the margin of the disk, slightly dilated at base.
D. Fl.-buds ovoid: filaments inserted at the corners of the 5-angled disk..4. *T. anglica*
DD. Fl.-buds subglobose: filaments inserted between the shallow rounded lobes.
5. *T. gallica*
CC. Petals persistent; filaments inserted between the lobes, slightly below the margin, filiform.
D. Bracts ovate-lanceolate: disk 10-lobed: shrub.....6. *T. pentandra*
DD. Bracts subulate.
E. Disk 5-lobed: erect shrub with upright panicles.....7. *T. odessana*
EE. Disk 10-lobed: usually a tree with spreading brs. and nodding panicles.
8. *T. chinensis*

1. **T. parviflòra** DC. Shrub or small tree to 5 m., with slender dark purple brs. usually arching: lvs. ovate, acuminate, semi-amplexicaul, scarious at apex: fls. light pink in slender racemes about 3 cm. long, lateral on last year's brts.; bracts linear-oblong, subobtuse, adnate at base, about as long as pedicel; calyx small, with obtuse lobes; petals ovate-oblong, upright, persistent; anthers apiculate; styles 3, scarcely half as long as ovary. Fl.iv–v. F.S.9:t.898(c). R.H.1855:401,t(c). Gn.61:272(h). (*T. tetrandra* var. *p.* Boiss., *T. tetrandra* var. *purpurea* Hort.) S. E. Eu. Cult. 1853. Zone V.—Often confused with *T. africana* and *T. tetrandra.*

A closely related species is **T. tetrándra** Pall. Brs. almost black: lvs. ovate-lanceolate, slightly narrowed at base, with diaphanous margin: fls. light pink; bracts broad and gibbous at base, adnate at the lower third, the free part triangular-lanceolate, acute, longer than pedicels; petals deciduous; styles 3–4, about ⅔ as long as ovary. S. E. Eu., W. Asia. Intr. 1821.

2. **T. juniperìna** Bge. Shrub or small tree to 5 m., densely branched with very thin and slender brts.: lvs. green, oblong-lanceolate, acuminate, scarious at apex: fls. bright pink in slender racemes 3–6 cm. long, lateral on last year's brs.; bracts linear-lanceolate, slightly longer than pedicels; pedicels slender, shorter than calyx; sepals ovate-lanceolate, acute, little shorter than the persistent petals; disk 5-lobed, with emarginate lobes. Fl.v. S.Z.1:t.71(c).

(*T. chinensis* Sieb., not Lour., *T. japonica* Hort., *T. plumosa* Hort.) N. and C. China, cult. in Japan. Cult. 1877.

A related species is **T. africàna** Poir. Racemes thicker and denser, 5–8 cm. long and 8–9 mm. thick: fls. nearly sessile; styles longer than ovary. Mediterr. region. Doubtful if in cult. Zone VIII?

3. **T. híspida** Willd. KASHGAR T. Shrub with slender upright brs.: lvs. bluish green or glaucous, ovate-lanceolate, acuminate, rounded or subcordate at base, finely pubescent like the brts.: fls. pink, nearly sessile, in dense racemes 5–7 cm. long, forming terminal panicles; bracts subcordate at base, acuminate; petals deciduous, much longer than sepals; disk 5-lobed, the filaments inserted on the lobes. Fl.VIII–IX. R.H.1894:352,t(c). S.H.2:f. 228a-d[1]. (*T. kashgarica* Lemoine.) From east of Caspian Sea to Songaria. Cult. 1893. Zone VI or VII?

4. **T. ánglica** Webb. ENGLISH T. Shrub to 3 m., with upright slender brs.; brts. reddish brown: lvs. ovate-lanceolate, narrowed at base, bright green: fls. whitish, tinged with pink, in slender racemes 3–5 cm. long; bracts lanceolate, subulate, more than twice as long as pedicels; petals deciduous; filaments dilated at base and attached to the lobes of the 5-angled disk, without glands between the filaments. Fl.VIII–X. S.E.2:t.261(c). Hooker, Jour. Bot. 3(1841):t.15. W. Eu. Cult. 1877. Zone VI or VII?

5. **T. gállica** L. FRENCH T. Shrub or small tree to 10 m., with slender erect or spreading brs.: lvs. dull to bluish green, ovate-lanceolate to rhombic-ovate, acute or acuminate, broad at base, with scarious margin: fls. pink, nearly sessile, in dense cylindric racemes 3–5 cm. long; bracts deltoid-ovate, acuminate, more than twice as long as pedicels; filaments inserted between the rounded lobes of the disk. Fl.VI–VIII. S.O.3:t.130(c). G.H.t.37(c). Hooker, Jour. Bot. 3(1841):t.15. M.A.t.76(h). Gn.34:329. Mediterr. region. Cult. 1596. Zone VI?

6. **T. pentándra** Pall. Shrub or small tree to 5 m.; brs. purple: lvs. lanceolate to ovate, acute, glaucous or pale green: fls. rosy-pink, in dense or slender racemes 3–8 cm. long forming large terminal panicles; bracts ovate-lanceolate, acute or acuminate, slightly longer than pedicels; petals elliptic, connivent; disk with 5 emarginate or 2-lobed lobes; styles linear-spatulate with connivent stigmas, about ½ as long as ovary. Fl.VIII–IX. B.M.8138(c). B.S.2:577. Gn.77:494(h). F.E.20:344,t.105(h). S.L.406(h). (*T. Pallasii* Desv., *T. hispida aestivalis* Hort., *T. amurensis* Hort.) S. E. Eu. to C. Asia. Cult. 1883. Zone V.—A variable species.

7. **T. odessàna** Stev. Shrub to 2 m., with upright slender brs.: lvs. lanceolate, subulate, decurrent: fls. pink, in slender racemes about 3 cm. long, on short naked peduncles: bracts linear-subulate, longer than the pedicels; pedicels deflexed, about as long as calyx; petals obovate, spreading; disk 5-lobed, with rounded lobes; styles often 4, sublinear, about ½ as long as ovary; anthers apiculate. Fl.VII–IX. Caspian region. Intr. about 1885. Zone V..

8. **T. chinénsis** Lour. CHINESE T. Shrub or small tree to 5 m., with slender spreading, often drooping brs. and very thin brts.: lvs. bluish green, lanceolate, acuminate, keeled: fls. pink, in slender racemes 3–5 cm. long, forming large and loose usually pendulous panicles; bracts linear-subulate, gibbous at base, longer than pedicels; sepals ovate, much shorter than petals: disk deeply 10-lobed; styles clavate, ⅖–¾ as long as ovary; stamens as long or twice as long as petals; anthers obtuse. Fl.VII–IX. Ito, Fig. Pl. Koishik. 2:t.14(c). China. Intr. 1916 (or earlier?). Zone VIII?

The very distinct **T. articulàta** Vahl with jointed brts., minute sheathing lvs. and 5-merous sessile fls. in terminal panicles, from N. E. Afr. and W. Asia is probably not hardy within our area.

2. **MYRICÀRIA** Desv. Deciduous shrubs or subshrubs; lvs. alternate, scale-like: fls. small, pink or white, short-pediceled or subsessile, in terminal or lateral dense racemes; sepals and petals 5; stamens 10, the filaments connate ⅓–½, rarely only at base; anthers introrse; ovary 1-celled, with 3 sessile stigmas; seeds with a stalked tuft of hairs: fr. a 3-valved caps. (Derived from Myrica, probably the ancient name of the Tamarisk.) About 10 species from Eu. to C. Asia, China and Siberia.

M. germànica Desv. Subshrub to 2 m., with upright wand-like stems, glabrous; lvs. lanceolate, obtuse, glandular-dotted, bluish green: fls. light pink or whitish, in terminal dense racemes, 10–20 cm. long, often with lateral ones at base; bracts ovate-lanceolate, long-acuminate below, with a broad membranous margin, exceeding the fl.-buds; stamens connate about ½. Fl. V–VIII. S.O.3:t.131(c). G.H.t.38(c). F.D.13:t.1248(c). (*Tamarix g.* L.) C. and S. Eu., W. Asia. Intr. about 1582. Zone V.

A related species is **M. dahùrica** Ehrenb. Racemes on lateral brts.; bracts oblong-ovate, obtusish, with a membranous margin all around, not exceeding the fl.-buds; stamens connate ⅓. Dahuria, Transbaicalia. Intr. 1816. Zone V.

Fam. 70. CISTACEAE Lindl. ROCK-ROSE FAMILY

Shrubs or herbs; lvs. usually opposite, rarely alternate, stipulate or exstipulate: fls. perfect, regular, solitary or in racemes and cymes; sepals 5 or sometimes 3, in ⅖ phyllotaxy; petals 5, rarely 3, caducous, sometimes wanting; convolutions of calyx and corolla in opposite directions; stamens numerous, hypogynous, unequal; ovary superior, 1-celled, with 3–10 parietal placentae; style 1: fr. a caps. dehiscent between the placentae; seeds with copious albumen and crustaceous testa; embryo usually curved.—Five genera with about 160 species in N. Am. and the Mediterr. region, few in E. Asia and in S. Am.

A. Lvs. usually opposite, longer than 1 cm.: stigma large.
  B. Caps. 5–10-valved: fls. white or red to purple: upright shrubs ..... 1. *Cistus*
  BB. Caps. 3-valved: fls. often yellow; usually procumbent subshrubs ..... 2. *Helianthemum*
AA. Lvs. alternate, crowded, small, 2.5–7 mm. long: fls. small, yellow; stigma minute; heath-like shrubs ..... 3. *Hudsonia*

1. **CISTUS** L. Rock-rose. Low upright shrubs, evergreen or half-evergreen, usually villous, more or less glandular and aromatic: lvs. opposite, entire, petioles connate at base, estipulate: fls. large in terminal and axillary cymes at end of brts., rarely solitary, white to purple; sepals 3 or 5; petals 5; stamens numerous; style elongated or short with a large 5–10-lobed stigma; ovary 5–10-celled, with many-ovuled placentae; caps. splitting into 5 or 10 valves. (*Kistos*, the ancient Greek name of the plant.) About 20 species in the Mediterr. region. Low shrubs with showy fls., not hardy north of the middle Atlantic states.

A. Sepals 5.
  B. Fls. red or purple.
    C. Lvs. 3-nerved, sessile.
      D. Fls. stalked: lvs. with straight revolute margin ..... 1. *C. albidus*
      DD. Fls. subsessile: lvs. with undulate margin ..... 2. *C. crispus*
    CC. Lvs. penninerved, short-petioled ..... 3. *C. villosus*
  BB. Fls. white.
    C. Sepals rounded at base: lvs. sessile, lanceolate, 3–8 mm. broad ... 4. *C. monspeliensis*
    CC. Sepals cordate at base.
      D. Lvs. sessile, 3-nerved ..... 5. *C. hirsutus*
      DD. Lvs. petioled, penninerved, 3-nerved at base.
        E. Lvs. 1.2–4.5 cm. long ..... 6. *C. salvifolius*
        EE. Lvs. 5–9 cm. long, cordate at base ..... 7. *C. populifolius*

AA. Sepals 3: fls. white: lvs. 3-nerved.
B. Lvs. subsessile: fls. usually solitary, long-stalked; sepals lepidote: plant viscid. 8. *C. ladaniferus*
BB. Lvs. petioled: fls. cymose; sepals hairy. 9. *C. laurifolius*

1. **C. álbidus** L. Shrub to 2 m.; young parts white-tomentose: lvs. sessile, elliptic to ovate-oblong, 2–5 cm. long, obtuse, revolute, 3-nerved at base, reticulate beneath and stellate-tomentose: fls. 3–8, stalked, about 6 cm. across, rosy lilac, the petals blotched yellow at base; sepals broad-ovate, short-acuminate; style longer than stamens. Fl.VI–VII. R.I.3:t.39(c). S.C.31(c). G.C.III.45:117(h). W. Mediterr. region. Cult. 1640. Zone VII or VIII.

2. **C. críspus** L. Compact shrub to 60 cm.; young brts. with long white hairs: lvs. sessile, elliptic-ovate to lanceolate, 1–4 cm. long, acute, undulate, rugose above, stellate-tomentose on both sides: fls. subsessile, purplish red, 3.5–4 cm. across, in dense terminal heads; sepals lanceolate, acuminate. Fl. VI–VII. R.I.3:t.38. S.C.22(c). Gn.34:252,t(c);79:299(h);83:176(h). W. Mediterr. region. Intr. 1656. Zone VII or VIII.

3. **C. villosus** L. Compact shrub to 1 m.; young brts. villous: lvs. elliptic to ovate-oblong, obtuse, abruptly narrowed into a short petiole, 2.5–6 cm. long, penninerved, rugose and sparingly stellate-pubescent above, more densely so beneath and grayish: fls. purple to rose-colored, 5–6 cm. across, petals yellowish at base, in 3–5-fld. terminal cymes; peduncle grayish tomentose; sepals ovate, acuminate, villous. Fl.VI–VII. B.M.43(c). R.I.3:t.40(c). F.D.13:t.1254(c). S.C.35(c). Gn.27:571. B.S.1:344. Mediterr. region. Intr. about 1650. Zone VI or VII.—Of the several vars. the hardiest is probably var. **taûricus** Grosser. Lower lvs. roundish, the middle ones obovate-spatulate, the upper lanceolate; pedicels twice as long as sepals. (*C. t.* Presl.) E. Mediterr. region. Cult. 1898.

C. v. × *ladaniferus* = **C. purpúreus** Lam. Young brts. villous and resinous: lvs. nearly sessile, oblong-lanceolate, 3-nerved at base, penninerved above, grayish tomentose beneath: fls. 6–8 cm. across, reddish purple with a dark red blotch at base of each petal. B.R.5:408(c). S.C.17(c). G.C.III.48:118, 119(h). Gn.31: 326,t(c);86:305(h). Orig. before 1790. Zone VIII?

4. **C. monspeliénsis** L. Shrub to 1.5 m.; brts. pilose, viscid when young: lvs. subsessile, lanceolate to linear-lanceolate, obtuse or acutish, 2–5 cm. long, revolute at margin, rugose and dark green above, grayish and stellate-pubescent beneath, hairy on the veins: fls. white, about 2.5 cm. across, in 3–10-fld. cymes; sepals ovate, acuminate, long-pilose like the pedicels; stigma subsessile. Fl.VI–VII. R.I.3:t.37(c). F.D.13:t.1252(c). S.C.27(c). W. Mediterr. region. Intr. before 1650. Zone VIII.

C. m. × *ladaniferus* = **C. Lorétii** Rouy & Fouc. Young brts. viscid and sparingly hairy: lvs. sessile, linear-lanceolate, 2–6 cm. long, revolute, viscid, grayish pubescent beneath: fls. 3–5, white, each petal with a crimson blotch at base, 5–6 cm. across; sepals 4 or 5, ovate. B.M.8490(c). G.C.III.66:25(h). Gn.78:539, 428(h);83:304(h). Orig. unknown.—Var. **albiflŏrus** Rouy & Fouc. Fls. pure white, the petals not blotched.—*C. m.* × *salvifolius* = *C. florentinus;* see under No. 6.

5. **C. hirsûtus** Lam. Shrub to 1 m.; young brts. with long white hairs: lvs. sessile, elliptic-lanceolate, obtuse, 3–6 cm. long, 3-nerved, pilose above, stellate-pubescent beneath: fls. in terminal cymes, 3–3.5 cm. across, white, the petals yellow at base; outer sepals cordate, ½ in. long, accrescent after anthesis, acuminate, the inner ones smaller, ovate. Fl.VI–VII. S.C.19(c). S. W. Eu. Intr. about 1650. Zone VII or VIII.

6. **C. salvifŏlius** L. Shrub to 60 cm.; young brts. thinly stellate-tomentose: lvs. short-petioled, oval to ovate-oblong, 1.5–4 cm. long, grayish green and rugose above, paler beneath, stellate-tomentose on both sides: fls. 1–3

white, the petals yellow at base, 3.5–4.5 cm. across; outer sepals cordate, acuminate, stellate-tomentose. Fl.v–vi. R.I.3:t.36(c). F.D.13:t.1253(c). S.C.54(c). Gn.76:352(h);83:305(h). Mediterr. region. Intr. about 1550. Zone VIII?

C. s. × *populifolius* = **C. corbariénsis** Pourr. Young brts. minutely pubescent: lvs. petioled, ovate, 2–5 cm. long, cordate or rounded at base, undulate at margin, stellate-pubescent on both sides: fls. 3.5 cm. across. R.I.3:t.36(c). S.C.8(c). Gn.78:58(h). (*C. populifolius minor* Hort.) Spontaneous hybrid. Zone VII?—*C. s.* × *monspeliensis* = **C. florentínus** Lam. Young brts. tomentose: lvs. short-petioled, elliptic-lanceolate, 2.5–3.5 cm. long, dull green and rugose above, grayish and stellate-pubescent beneath, 3-nerved at base. S.C.t.59(c). Gn.53:130, 134; 83:305(h). Spontaneous hybrid. Zone VII?

7. **C. populifòlius** L. Shrub to 2 m.; young brts. slightly pubescent and viscid; lvs. long-petioled, ovate, acuminate, cordate, 5–9 cm. long, glabrous, reticulate beneath; petiole 1–2.5 cm. long, ciliate: fls. 2–5, white, about 5 cm. across; petals yellow at base; outer sepals cordate at base. Fl.vi–vii. S.C. 23 and 70(c). (*C. cordifolius* Mill.) S. W. Eu. Cult. 1656. Zone VIII?

C. p. × *salvifolius* = *C. corbariensis;* see under No. 6.

8. **C. ladaníferus** L. Shrub to 1.5 m.; brts. very viscid: lvs. subsessile, lanceolate or linear-lanceolate, 4–8 cm. long, narrowed at ends, 3-nerved, glabrous and viscid above, gray-tomentose beneath: fls. solitary, 7–10 cm. across, white, each petal with a large purple blotch at base; sepals 3, concave, lepidote, yellow. Fl.vi–vii. H.A.13:t.36(c). L.D.4:t.265(c). S.C.1(c). Gn.30:30,t(c);66:257(h);78:616(h). W. Mediterr. region. Intr. 1629. Zone VIII.—Var. **albifòrus** Dun. Petals only yellow at base, not blotched purple. S.C.84(c). Gn.89:356. (Var. *immaculatus* Hort.)

C. l. × *monspeliensis* = *C. Loretii;* see under No. 4.—*C. l.* × *laurifolius* = *C. cyprius;* see under No. 9.

9. **C. laurifòlius** L. Shrub to 2.5 m.; young brts. hairy and viscid: lvs. petioled, ovate to ovate-lanceolate, 3.5–7 cm. long, acuminate, rounded at base, 3-nerved, undulate at margin, glabrous and dark green above, tomentose beneath, viscid: fls. 3–8, in long-peduncled cymes, 5–7 cm. across, white, petals yellow at base; sepals 3, ovate, concave, pubescent. Fl.vi–viii. R.I. 3:t.37(c). S.C.52(c). Gn.53:131;64:234. Gs.2:279(h). M.G.32:297(h). Mediterr. region. Intr. 1731. Zone VII?

C. l. × *ladaniferus* = **C. cýprius** Lam. Shrub to 2.5 m.; young brts. glutinous: lvs. oblong-lanceolate, 4–8 cm. long, narrow at ends, glabrous above, gray-pubescent beneath, viscid: fls. 3–6, in long-peduncled cymes, about 7 cm. across; white, each petal with a purple blotch; sepals lepidote. S.C.39(c). B.M.112(c, as *C. ladaniferus*). Gn.76:438(h);83:389(h). R.H.1917:327, 329(h). Orig. before 1790.

2. **HELIÁNTHEMUM** Adans. Sun-rose. Evergreen or half-evergreen, shrubby, suffruticose or herbaceous plants, rarely annual: lvs. mostly opposite, or the upper ones alternate, rarely all alternate, entire, with or without stipules: fls. in terminal raceme- or umbel-like or subcapitate cymes, usually yellow, sometimes partly apetalous and cleistogamous; sepals 3 or 5 and unequal; petals 5; stamens many, rarely only 7–20: ovary 1-celled or imperfectly 3-celled; style slender or short or nearly wanting: fr. a 3-valved caps., with several to many seeds; embryo folded or curved. (Greek *helios*, sun, and *anthemon*, flower.) Including *Halimium* Spach, *Crocanthemum* Spach and *Tuberaria* Spach. About 110 species in N. Am., Eu., N. Afr. and W. Asia; few in S. Am.—Low, often prostrate, sun-loving plants suited for rockeries, grown for their profuse yellow, rarely white to purple fls.; most species like limestone soil.—For further information see the monograph by Grosser (E. P. 1*V*. 193 [1903]), also Janchen, Die Cistaceen Oesterreich-Ungarns (1909).

A. Style short and straight: sepals 3 or 5: embryo curved: lvs. exstipulate. (Sect. HALIMIUM Dun.) ..... 1. *H. lasianthum*
AA. Styles slender, usually curved; sepals 5: embryo folded. (Sect. EUHELIANTHEMUM Dun.)
B. Style as long or longer than stamens: lvs. stipulate.
C. Stipules linear-subulate; the lower and middle ones as long as petioles: fls white. 2. *H. appenninum*
CC. Stipules lanceolate or linear-lanceolate, longer than the petiole: fls. usually yellow.
D. Lvs. stellate-tomentose on both sides (see also *H. sulphureum* under No. 4). 3. *H. glaucum*
DD. Lvs. glabrous or only pilose, rarely slightly tomentose above..4. *H. nummularium*
BB. Style shorter than stamens: fls. yellow: lvs. exstipulate.
C. Lvs. gray-pubescent beneath: cymes many-fld. ..... 5. *H. canum*
CC. Lvs. green on both sides: cymes few-fld. ..... 6. *H. alpestre*

1. **H. lasiánthum** Pers. Upright shrub to 1 m., with spreading brs.; young brts. grayish stellate-tomentose intermixed with white hairs: lvs. short-petioled, oval to ovate-oblong or lanceolate, 1.5–3.5 cm. long, obtuse or mucronulate, 3-nerved at base, grayish tomentulose and with long white hairs when young; upper and middle lvs. of flowering brts. broad-ovate, sessile, smaller: fls. 1–5 at end of short brts., 3.5 cm. across, yellow, each petal with a brownish purple blotch at base; pedicels silky-villous, 1–2 cm. long: sepals 3, ovate, acuminate, stellate-tomentose. Fl.v–vi. B.M.264(c). S.C.50(c). B.S.1:613. Gn.84:355. (*H. formosum* Dun., *Halimium l.* Grosser.) Portugal. Intr. 1780. Zone VIII?—This is perhaps the handsomest species of the genus, but tender and so are the following cult. species of the sect. Halimium.

H. ocymoides Pers. Lvs. lanceolate to oblong-obovate, the upper ones of the flowering brts. green and sessile, those of the sterile brts. gray and petioled: fls. in loose panicles, bright yellow, each petal purple at base, 2.5–3 cm. across; pedicels slender, sparingly hirsute; sepals ovate-lanceolate, sparingly pilose or nearly glabrous. B.M.627(c). S.C.13,40(c). (*H. algarvense* Dun., *Halimium o.* Willk. & Lge.) Spain and Portugal. Intr. 1880.—**H. alyssoides** Vent. Lvs. ovate-lanceolate to oblong-obovate, the lower short-petioled, the upper ones sessile: fls. bright yellow, unblotched, 3.5–4 cm. across; peduncles, pedicels and sepals short-villous. S.C.81(c). S.L.222(h). (*H. scabrosum* Pers., *Halimium a.* K. Koch.) S. W. Eu. Intr. 1775.—**H. halimifólium** Willd. Young brts. lepidote and grayish pubescent: lvs. short-petioled, oblong or oblong-obovate to lanceolate, attenuate at base, white-tomentose and lepidote when young, later grayish green: fls. 2–7, yellow, each petal with a small dark blotch, 3.5 cm. across; sepals 5, lepidote, and pubescent or nearly glabrous, the outer ones smaller. S.C.t.4(c). E.P.IV.193:40. (*Halimium h.* Willk. & Lge.) S. Eu., N. Afr. Cult. 1656.—**H. umbellatum** Mill. Lvs. sessile, linear to lanceolate, revolute, 1-nerved, white-tomentose beneath: fls. white, about 2 cm. across; petals yellow at base, in slender panicles: sepals 3, ovate, hairy. S.C.5(c). B.S.1:615. (*Halimium u.* Spach.) S. Eu., N. Afr. Intr. 1731.

Into this subgenus belongs also **H. canadénse** Michx. which is hardly suffruticose: it is a perennial with slender, little branched upright stems to 50 cm. high, elliptic to lanceolate lvs. and fls. of 2 kinds, large solitary yellow fls. 2.5 cm. broad and smaller apetalous and cleistogamous ones in 1–4-fld. clusters. Gr.G.1:t.87. S.H.2:f.234h-k. (*Halimium c.* Grosser.) E. N. Am.

2. **H. appennìnum** Mill. Low much-branched subshrub with upright or procumbent stems to 40 cm.; young brts. and lvs. whitish or grayish tomentulose: lvs. petioled, oblong-elliptic to linear-oblong, obtusish or acute, 1–3 cm. long, usually revolute, grayish tomentulose on both sides or green above: fls. in 3–10-fld. racemes, white, 2.5–3 cm. across; sepals 5, the 2 outer ones linear-lanceolate, ⅓ or ½ as long as the inner elliptic ones, white-tomentulose; petals obovate. Fl.v–viii. S.C.62(c). S.E.19:t.1322(c). R.I.3:f.4554(c). F.D.13:t.1261(c). (*H. pulverulentum* DC., *H. polifolium* Pers.) W. and S. Eu., Asia Minor. Intr. 1731. Zone V or VI.—Var. **róseum** Gross. Lvs. lanceolate, acutish, 2–3.5 cm. long, with flat margin; greenish above: fls. reddish. S.C.7(c). (Var. *rhodanthum* Bean.) S. Eu.—Var. **versícolor** Grosser. Lvs. about 1.5 cm. long, glabrous and green above: fls. rose, pink or reddish, sometimes variegated. S.C.26(c).

3. **H. glaùcum** Pers. Cespitose subshrub with upright or procumbent stems: lvs. petioled, the lower ones suborbicular, the middle and upper ones ovate-oblong to oblanceolate, 1–2 cm. long, flat or slightly revolute at the margin, stellate-tomentose on both sides, glaucous beneath: fls. in 3–15-fld. racemes, yellow or white, about 2 cm. across; bracts shorter than pedicels; outer sepals linear-lanceolate, green, ciliolate, the inner ones ovate, tomentulose. Cavanilles, Ic. Pl. Rar.3:t.261. S. Eu., N. Afr. Intr. 1815. Zone VIII?—Var. **cròceum** Boiss. Fls. bright yellow; sepals densely stellate tomentulose. S.C.53(c). (*H. c.* Pers.) R.I.3:f.4552(c).

4. **H. nummulàrium** L. Low subshrub, with decumbent and ascending stems, scarcely more than 30 cm. tall; brts. green, hairy: lvs. petioled, elliptic or ovate to lanceolate, 2–5 cm. long, with flat margin, green on both sides or grayish tomentose beneath; stipules foliaceous, ciliate: fls. in loose many-fld. racemes, yellow, about 2.5 cm. across; inner sepals ovate or elliptic, with hairy ribs, twice or thrice as long as the outer ones. Fl.v–vii. (*H. chamaecistus* Mill., *H. vulgare* Gaertn., *H. variabile* Spach, *H. Helianthemum* Karst.) Eu., W. Asia.—A very variable species with many vars. and forms; sometimes divided into several species.

A. Lvs. green on both sides, glabrous, or with simple or fascicled hairs: Var. **obscùrum** Schneid. Lvs. hirsute or pilose on both sides; sepals hirsute and villous. R.I.3:f.4547–8(c). F.D.13:t.1260(c). (*H. o.* Pers., *H. hirsutum* Mérat, *H. Chamaecistus* var. *hirsutum* Grosser.)—Var. **grandiflorum** Schneid. Lvs. broad-ovate to oblong-ovate, with simple hairs above and fascicled hairs beneath, ciliate: fls. about 3 cm. across; sepals pilose on the veins. S.C.69(c). R.I.3:f.4549(c). (*H. g.* Lam.)—Var. **cúpreum** Schneid. Lvs. sparingly pilose and lustrous above: fls. copper-colored, sometimes variegated with yellow. S.C.58(c). A form with double fls. is var. **cúpreo-plènum** Schneid. S.C.72(c). (*H. hyssopifolium* var. *multiplex* Sweet.); a form with safran-yellow fls. more or less suffused with copper-color is var. **crocàtum** Rehd. S.C.92(c). (*H. hyssopifolium* var. *c.* Sweet.)—Var. **glábrum** Schneid. Lvs. bright green, glabrous or only ciliate and pilose on the midrib beneath; sepals nearly glabrous. (*H. Chamaecistus* var. *serpyllifolium* Grosser, *H. nitidum* Clementi.)

AA. Lvs. green above, grayish tomentose beneath, with often slightly revolute margin: Var. **tomentòsum** Schneid. Lvs. oblong to lanceolate, the lower ones often ovate, 5–15 mm. long, appressed-pubescent, rarely glabrous above; fls. yellow, about 1.5 cm. across; sepals pubescent or glabrescent. R.I.3:f.4547(c). S.C.34(c). (*H. t.* Dun., *H. nummularium* f. *discolor* Janchen, *H. chamaecistus* var. *discolor* Wuensche.) A form with double fls. is var. **múltiplex** Schneid. S.C.64(c). (*H. vulgare* var. *m.* Sweet.)—Var. **Scopòlii** Schneid. Lvs. ovate to ovate-lanceolate, 2–4 cm. long, pubescent above: fls. yellow, 2.5 cm. across; sepals hirsute on veins, purplish. (*H. Chamaecistus* var. *S.* Grosser.)—Var. **stramíneum** Rehd. Lvs. green above, whitish beneath: fls. sulphur-yellow; petals with a darker yellow blotch at base. S.C.93(c). —Var. **róseum** Schneid. Lvs. elliptic, the lower ones roundish, gray-tomentose beneath: fls. pale rose. S.C.55(c). (*H. r.* Sweet, *H. pyrenaicum* Janchen.) A form with double fls. is var. **róseo-plènum** Schneid. S.C.86(c). (*H. roseum* var. *multiplex* Sweet.)—Var. **mutàbile** Rehd. Lvs. sparingly pilose or glabrescent above, grayish white-tomentose beneath: fls. pale rose or sometimes variegated with white; sepals with reddish villous veins, glabrous between the veins. S.C.106(c). G.O.t.46(c). Gs.3:107(h). (*H. m.* Pers.)—Var. **venústum** Rehd. Brts. purplish: lvs. lustrous dark green above, white-tomentose beneath: fls. dark crimson, the petals with yellow spot at base;

sepals stellate-puberulous. S.C.10(c). (*H. v.* Sweet.)—Var. **diversifòlium** Rehd. Lvs. green and pilose above, the lower ones obtuse, flat, the upper ones linear-lanceolate, acute, revolute: fls. red, petals with a dark red blotch at base. S.C.95(c). (*H. d.* Sweet.) A form with double fls. is var. **rubroplènum** Rehd. S.C.98(c). (*H. d.* var. *multiplex* Sweet, *H. Chamaecistus* var. *d. multiplex* Bean.)—Var. **macrânthum** Grosser. Lvs. ovate-oblong, acutish, flat, pilose or nearly glabrous above, thinly grayish tomentose beneath: fls. white, 3.5–4 cm. across; petals with yellow blotch at base. S.C.103(c). (*H. m.* Sweet.)—A form with double fls. is var. **albo-plenum** Schneid. S.C.104(c). (*H. m.* var. *multiplex* Sweet.)

H. n. × *appenninum* = **C. sulphùreum** Willd. Lvs. petioled, lanceolate to linear-lanceolate, 1–2 cm. long, green and stellate-pilose above, grayish stellate-tomentose beneath; stipules linear-subulate, longer than the petioles: fls. sulphur-yellow in few-fld. racemes; outer sepals narrow-linear, half as long as the inner elliptic ones, stellate-tomentose. S.C.37(c). Orig. before 1813.—A form with rose fls. is var. **rôseum** Rehd. S.C.t.51(c). (*H. canescens* Sweet); and a form with copper-colored fls. is var. **cúpreum** Rehd. S.C.66(c). (*H. c.* Sweet.)

5. **H. cànum** Baumg. (not Grosser). Dwarf compact shrub, about 15 cm. high; brts. pubescent and sparingly pilose: lvs. short-petioled, oblong to linear-lanceolate, 1–2.5 cm. long, acute or acutish, green and strigose-pilose above, grayish or whitish tomentose beneath: fls. bright yellow, about 1.2 cm. across, usually in 3–6-fld. racemes; sepals tomentulose and pilose or villous, the outer ones linear-lanceolate, about ½ as long as the inner ovate obtuse ones. Fl.VI–VIII. S.C.77(c). G.H.2:t.110(c). R.I.3:f.4553,4554(c). (*H. vineale* Pers., *H. marifolium* Mill., not Dun.) C. and S. Eu., Asia Minor. Intr. 1823. Zone V.

6. **H. alpéstre** Dun. Low cespitose subshrub: lvs. ovate-lanceolate to lanceolate, 1–2 cm. long, obtuse or acutish, flat, green and glabrous on both sides or sparingly strigose-pilose: fls. bright yellow, about 1.5 cm. across. S.C.2(c). L.B.131(c). R.I.3:4536(c). Mts. of S. Eu. Intr. 1816. Zone V.

A related species is **H. oelándicum** Willd. Lvs. oblong-lanceolate to lanceolate, 6–10 mm. long, glabrous or pilose on midrib beneath and margin, fleshy: fls. 3–4, yellow, 6–8 mm. across; petals scarcely longer than sepals. Reichenbach, Ic. Pl. Crit.t.1(c). Spitzbergen, Oeland, Engl. The true species probably not in cult.

Closely related to Helianthemum is the genus **Fumàna** Spach, subshrubs differing chiefly in the outer stamens being sterile and in the anatropous ovules. About 9 species in Eu., N. Afr. and W. Asia. **F. nudifòlia** Janchen. Low cespitose subshrub with procumbent brs.: lvs. linear, 5–35 mm. long, ciliate, estipulate: fls. terminal, 1–4, stalked, yellow, 1 cm. across; outer sepals about half as long as the inner broad-ovate ones; petals pointed. R.I.3:f.4531(c). F.D.13:t.1257(c). S.C.16(c). E.P.IV.193:126. (*F. procumbens* Gren. & Godr., *Helianthemum Fumana* Mill.) Eu., W. Asia. Intr. 1752. Zone V.

3. **HUDSÒNIA** L. Low evergreen heath-like shrubs or subshrubs, with tufted diffusely branched stems: lvs. alternate, sessile, scale-like or subulate, exstipulate: fls. solitary at the end of short brts., yellow; sepals 3, equal, petals 5, obovate-oblong, fugacious; stamens 10–30; ovary 1-celled, with 3 2-ovuled placentae, style filiform; stigma minute; fr. a 3-valved caps. enclosed by the connivent sepals; embryo coiled. (After William Hudson, an English botanist; 1730–93.) Three species in E. N. Am.—Rarely cultivated, difficult to grow and short-lived; they thrive best in sandy soil.

H. tomentòsa Nutt. Tufted shrub to 20 cm. high; hoary-pubescent: lvs. elliptic to oblong, about 2 mm. long, densely imbricated and appressed: fls. bright yellow, 8 mm. across, sessile or nearly so; sepals obtuse: caps. glabrous. Fl.V–VII. G.G.1:t.90. E.P.IV.193:132. S.H.2:f.237. N. B. to Va. and along

the Grt. Lakes to Minn.; seashore and lake and river shores. Intr. 1826. Zone IV.

Related species are **H. ericoïdes** L. Soft-pubescent, greenish: lvs. slender, subulate, 6–8 mm. long: fls. on slender pedicels 1–1.5 cm. long; sepals acutish. S.C.36(c). L.B.2:192(c). N. S. to N. C. Intr. 1805.—**H. montana** Nutt. Slightly villous, green: lvs. subulate, 3–6 mm. long: fls. about 1 cm. across on a pedicel 1 cm. long; sepals acuminate. High mts. of N. C. Intr.?

Fam. 71. VIOLACEAE DC. VIOLET FAMILY

Herbs, shrubs or small trees: lvs. usually alternate, stipulate: fls. perfect, regular or irregular; sepals 5, distinct or nearly so; petals 5, often one spurred; stamens 5, connivent; ovary 1-celled, with 2–5 placentae, ovules usually many, anatropous; style usually club-shaped: fr. a loculicidal caps., rarely a berry.—About 15 genera with 300 species in both hemispheres.

HYMENANTHÈRA R. Br. Evergreen or half-evergreen shrubs or small trees: lvs. alternate, sometimes fascicled, small, entire or toothed; stipules deciduous: fls. small, axillary, solitary or fascicled; sepals and petals 5; anthers nearly sessile, connate into a tube with a membranous appendage at the apex and 5 scale-like appendages on the back; ovary with 2 1-ovuled placentae; style short, with 2-lobed stigma: fr. a berry with 1 or 2 subglobose seeds. (Greek *hymen*, membran, and anthera; referring to the membranous appendage of the anthers.) Four or 5 species in Australasia.

H. crassifòlia Hook. f. Dense half-evergreen shrub to 2 m., with rigid brs. pubescent when young: lvs. crowded, short-stalked, obovate, 1–2.5 cm. long, rounded or slightly emarginate at apex, entire, glabrous, thickish: fls. solitary or few, short-stalked, yellowish white or brownish, 4 mm. across: fr. subglobose, white, about 6 mm. across. Fl.v; fr.viii. G.C.III.12:412. Gn.11: 145;84:122. S.H.2:f.238. S.L.65(h). New Zeal. Intr. about 1875. Zone VII or VIII.

Fam. 72. FLACOURTIACEAE Dum. FLACOURTIA FAMILY

Trees or shrubs, rarely climbing: lvs. usually alternate and often 2-ranked, usually pinnately veined, undivided; stipules usually caducous: fls. usually in cymes, regular, perfect, rarely unisexual; sepal 2–6, usually 4–5, imbricate or valvate, often persistent and accrescent after anthesis; petals as many as sepals, rarely more, sometimes wanting; receptacle often with appendages between the ovary and the petals; stamens numerous, hypogynous or perigynous; ovary superior or nearly so, 1-celled, with usually 3–5 parietal placentae; ovules usually numerous, apotropous or epitropous; styles as many as placentae or 1: fr. a caps. or berry, rarely drupe or achene; seed albuminous; embryo straight. About 70 genera with 500 species, mostly tropical. Besides the two genera described below possibly *Carrierea calycina* Franch. may be hardy in the warmer parts of our area.

A. Petiole 6–15 cm. long; lvs. 5–11-veined at base: sepals imbricate: fr. a berry.....1. *Idesia*
AA. Petioles 2–4 cm. long; lvs. 5-nerved at base; sepals valvate: fr. a caps.....2. *Poliothyrsis*

1. IDÈSIA Maxim. Deciduous tree; winter-buds glabrous, with several to many imbricate acuminate scales: lvs. alternate, long-petioled, dentate; stipules small, caducous: fls. dioecious or polygamous, apetalous, in large terminal panicles; sepals 3–6, usually 5, imbricate, yellowish, pubescent; staminate fls. with numerous stamens and a small rudimentary pistil; filaments filiform, pubescent; anthers elliptic; pistillate fls. with a subglobose ovary and short staminodes at base; styles usually 5, spreading, with obovate stigmas:

fr. a fleshy, many-seeded berry; seeds roundish-ovoid. (After Eberhard Ysbrant Ides, a Dutch traveler in China.)

I. polycárpa Maxim. Tree to 15 m.; bark close, grayish white; brs. spreading, forming a broad round head: lvs. ovate to oblong-ovate, acuminate, cordate or subcordate, 12–25 cm. long, remotely crenate-serrate, deep green above, glaucous beneath, glabrous, except bearded in the axils; petiole 6–15 cm. long, with 2 glands at apex: fls. greenish yellow, fragrant, slender-pediceled, in pendulous panicles 10–25 cm. long; staminate fls. about 1.5 cm., pistillate 8 mm. across; fr. dull orange-red or orange-brown, 7–8 mm. across, in large pendulous panicles. Fl.v–vi; fr.ix–xi. B.M.6794(c). L.I.t.13. G.C.III.39:13. R.H.1888:463–5. Gn.13:99. J.L.27:410,t(h). F.E.24:853(h). (*Polycarpa Maximowiczii* Hort.) S. Japan, C. and W. China. Intr. about 1864. Zone VI or VII.—Var. **vestîta** Diels. Lvs. densely pubescent or tomentose beneath. W. China. Intr. 1908.

2. **POLIOTHÝRSIS** Oliv. Deciduous tree; winter-buds with 2 or 4 outer pubescent scales: lvs. petioled, alternate, dentate; stipules small, caducous: fls. monoecious, apetalous, in terminal panicles; sepals 5, ovate to lanceolate, valvate: staminate fls. with numerous free short stamens and a rudimentary pistil: pistillate fls. with staminodes at base of ovary: styles 3, reflexed, 2-parted at apex: fr. a 3–4-valved caps.; seeds many, oblong, with a broad wing, the seed in the centre. (Greek, *polios*, grayish white, and *thyrsos*, panicle; referring to the color of the infl.) One species in China.

P. sinénsis Oliv. Slender tree to 15 m.; young brts. pubescent: lvs. ovate to ovate-oblong, acuminate, usually rounded or truncate at base, 8–16 cm. long, dentate, pubescent beneath or nearly glabrous; petiole 2–4 cm. long: fls. greenish white changing to yellow, 6–8 mm. across, in loose panicles 10–20 cm. long; sepals whitish tomentose outside: caps. oblong-ovoid, nearly 2 cm. long. Fl.vii; fr.x–xi. H.I.19:1885. Gt.73:180. S.H.2:f.243. C. China. Intr. 1908. Zone VII or VIII.

Fam 73. STACHYURACEAE Gilg. STACHYURUS FAMILY

Contains only the following genus.

STACHYÙRUS Sieb. & Zucc. Shrubs or small trees, deciduous to evergreen; brts. with large pith; winter-buds small, with 2–4 outer scales: lvs. alternate, slender-petioled, serrate; stipules small, caducous: fls. regular, perfect or functionally dioecious, subsessile, in pendulous racemes axillary on last year's brs.; sepals and petals 4, imbricate; stamens 8, distinct; ovary superior, incompletely 4-celled by the intrusion of the parietal placentae; style short, with a 4-lobed stigma; ovules many: fr. berry-like, with leathery pericarp; seeds many, with soft arillus, albuminous; embryo straight. (Greek *stachys*, spike, and *urus*, tail; referring to the shape of the infl.) Five or 6 species in E. Asia and the Himal.—Planted for the early appearing racemes of yellow fls.

S. praècox Sieb. & Zucc. Shrub to 4 m., with slender spreading brs.; brts. reddish brown or chestnut-brown, lustrous, glabrous: lvs. elliptic-ovate to ovate-lanceolate, acuminate, rounded at base, 7–14 cm. long, serrate with slightly spreading teeth, glabrous and lustrous beneath or slightly pubescent on the veins; racemes before the lvs. short-stalked, 5–8 cm. long; fls. campanulate, yellow, about 8 mm. long; style shorter than petals: fr. globose, about 8 mm. across; greenish yellow, with reddish cheek. Fl.iii–iv; fr.vii–

VIII. B.M.6631(c). S.I.1:t.74. R.H.1908:87. Gn.75:204. G.C.III.21:285. B.S.2:546. M.O.72(h). Japan. Cult. 1865. Zone (V), VI.

A closely related species is **S. chinénsis** Franch. Brts. greenish or dull brown: lvs. ovate to oblong-ovate, 6–12 cm. long, long-acuminate, rounded or subcordate at base, crenate-serrate: fls. more spreading; style as long or slightly longer than petals: fr. about 6 mm. across. Gn.88:79. China. Intr. 1908. Zone VII.

Fam. 74. **CACTACEAE** Lindl. CACTUS FAMILY

Shrubs or trees with fleshy stems branched or unbranched, cylindric, flattened or globular, often constricted or jointed, with watery or milky juice: lvs. alternate, scale-like or wanting, rarely flat and broad, usually with bundles of spines in the axils: fls. perfect, usually regular; sepals and petals usually many, rarely 8–10, similar and gradually passing into each other; stamens many, spirally or in groups, inside of the receptacle; ovary inferior, with 3 or more parietal placentae; style 1 with lobed stigma; ovules many: fr. a berry, sometimes dry; seeds small; embryo straight or curved. Syn.: *Opuntiaceae* H. B. K.—About 40 genera and 1200 species in N., C. and S. Am., few in Africa.—For further information see Britton & Rose, Cactaceae. 4 vols. (1919–23).

A. Stems not or not conspicuously jointed: lvs. obsolete: fls. with calyx-tube prolonged beyond the ovary.
  B. Fls. borne on the tubercles or ribs, at or near the areole; ovary scaly.
    C. Stem ribbed or with vertical rows of tubercles: fls. borne close to the fully developed cluster of spines ..... 1. *Echinocereus*
    CC. Stem with tubercles arranged in spiral rows: fls. close to areolae which subsequently develop spines ..... 2. *Echinocactus*
  BB. Fls. arising from the axils of the tubercles or near their base; stem broken into tubercles arranged in spiral rows: ovary naked ..... 3. *Mamillaria*
AA. Stems conspicuously jointed, flattened or cylindric: lvs. scale-like: calyx-tube not prolonged beyond the ovary ..... 4. *Opuntia*

1. **ECHINOCÈREUS** Engelm. Stems ovoid to cylindric, ribbed and angled or with tubercles in vertical rows, spiny: fls. from areolae just above the spine-bearing areolae; ovary scaly; style filiform, longer than stamens, shorter than petals: fr. fleshy; seeds tuberculate, almost destitute of albumen; embryo straight. (Greek *echinos*, hedge-hog, and *cereus*.) About 40 species in N. Am. and Mex.

A. Fls. green; areolae suborbicular with 12–18 radial spines ..... 1. *E. viridiflorus*
AA. Fls. rosy-purple; areolae oblong, with 20–30 radial spines ..... 2. *E. Reichenbachii*

1. **E. viridiflòrus** Engelm. & Gray. Stems solitary or clustered, 8–18 cm. high and 3–5 cm. thick, with 13 ribs; radial spines 12–18, horizontally spreading, straight or slightly curved, the lower lateral ones the longest, to 1.2 cm. long, ruby-red, the others white, central spines usually absent or one, stout, about 2 cm. long and curved upwards, red with brown point: fls. lateral, broad-funnel form, 2.5–3 cm. long; petals green, each with an olive-green to pink stripe in the middle; ovary and tube spiny: fr. ellipsoid, about 1 cm. long, greenish. Fl.v–vi. B.M.6788(c). B.B.2:569. (*Cereus v.* Engelm.) Wyo. and Kans. to Tex. and N. Mex. Cult. 1844. Zone V.

2. **E. Reichenbáchii** Haage Jr. Stems globose to cylindric-ovoid, to 5 or rarely to 15 cm. high, solitary or in clusters of 6–12; ribs 12–13 with confluent tubercles; spines numerous, white or rarely pink or brown, radial ones 20–30, pectinate, straight or slightly recurved, the lateral ones 4–8 mm. long, the upper and lower ones shorter, central spines wanting or few, short: fls. rotate-funnelform, 6–8 cm. long and nearly as broad; petals rosy-purple: fr. ovoid, 1.8–2 cm. long, greenish. B.M.6669(c). B.B.2:569. Gt.29:52. (*E. caespitòsus* Engelm.) Kans. to Tex. and Mex. Cult. 1844. Zone VI or VII?

Another species is **E. coccineus** Engelm. Stems with 9–11 ribs; spines 1–15, with usually 4 stout central ones, to 3 cm. long: fls. scarlet. B.M.6774(c). (*E. phoeniceus* Engelm., *E. paucispinus* Hook. f., not Engelm.) Colo. to N. Mex., Ariz. and Mex. Cult. 1885. Zone VI?

2. **ECHINOCÁCTUS** Link. & Otto. Stems globose to oblong or cylindric, tubercled, the tubercles arranged in spiral or vertical rows, spine-bearing: fls. borne on the tubercles, at or near the areolae from which subsequently spines develop; calyx-tube scaly; petals numerous; stamens numerous; style columnar: fr. usually covered with scales and often with tufts of bristles: embryo curved. (Greek *echinos*, hedge-hog, and *cactus*.) About 200 species from N. Am. to S. Am.

E. Simpsònii Engelm. Stems globose, to 15 cm. high and to 10 cm. across; tubercles ovoid, slightly 4-sided at base, 1.2–1.6 cm. long; central spines 5–7, yellowish below, red or red-brown above, 1–3 cm. long, lateral 15–20, slightly shorter, whitish: fls. rosy-pink, about 2 cm. across, borne to one side at end of tubercles; petals oblong, obtuse, crenulate, the inner narrower, acutish; filaments golden-yellow: berry dry, 6–7 mm. across, with a few scales near apex. Fl.IV–V. B.B.2:570. G.C.II.6:242. W.G.2:90. (*Pediocactus S.* Brit. & Rose, *Mamillaria Purpusii* and *M. Spaethii* K. Schum.) Wash. and Mont. to Kans. and N. Mex. Intr. before 1876. Zone V.

3. **MAMILLÀRIA** Haw. Stems simple or branched and clustered, usually hemispherical or short-cylindric, often depressed or sometimes elongated; the surface broken up into spirally arranged tubercles (mamillae) spiny at apex: fls. usually short-funnelform, with naked or nearly naked tube and ovary, borne in the woolly axils between the tubercles or at the inner end of a narrow groove on the upper surface: fr. globose to clavate, smooth, berry-like. (Latin *mamilla*, nipple; referring to the shape of the tubercles.) About 600 species in N. and C. Am.

A. Central spines 1 or wanting: fls. yellow.....1. *M. missouriensis*
AA. Central spines several: fls. purple, 3.5–5 cm. across.....2. *M. vivipara*

1. **M. missouriénsis** Sweet. Stems nearly simple, to 6 cm. high and 3–5 cm. across or cespitose; tubercles cylindric-conical, spreading, slightly grooved; spines white, weak, puberulent, the radial ones spreading, 12–17, the central one 1–1.2 cm. long, stout, often wanting: fls. tubular, about 2.5 cm. long, yellow to fawn-color with reddish streaks, from the upper surface of the tubercle; sepals fimbriate; petals acute or acuminate; stamens and style shorter than petals: fr. red, subglobose or pyriform, 6–8 mm. long; seeds subglobose, black, pitted. Fl.v. B.B.2:570. (*M. Nuttallii* Engelm., *Cactus m.* Ktze., *Neobesseya m.* Brit. & Rose. *Coryphantha m.* Brit. & Rose.) S. Dak. to Kans., Colo. and Tex. Intr. 1813. Zone V?

2. **M. vivípara** Haw. Stems 3–12 cm. high and 3–5 cm. thick; tubercles cylindric-conical, slightly grooved, with 3–8 slender reddish brown central spines 1–2 cm. long, surrounded by 12–25 lateral ones somewhat shorter, whitish or greenish: fls. purple, 3.5–5 cm. across; sepals fringed; petals lanceolate: fr. ovoid, 1.2–1.8 cm. long, green; seeds light brown, obovoid, pitted. Fl.v. B.B.2:571. (*Coryphantha v.* Brit. & Rose.) Man. and Alberta to Minn., Colo. and Kans. Intr. 1913. Zone V.

4. **OPÙNTIA** Mill. Stems conspicuously jointed, the joints flattened or terete, procumbent or upright, sometimes tree-like: lvs. scale-like, spirally arranged, caducous, bearing in their axils areolae covered with short wool

intermixed with barbed bristles and usually with spines: fls. on the upper part of the joints, on the bristle-bearing part of the areolae; ovary usually with bristle- and spine-bearing areolae; sepals and petals spreading, rotate; style cylindric, with 5–8-lobed stigma: fr. usually pear-shaped, fleshy, frequently edible, rarely dry; seed flattened or disk-like. (*Opountia*, ancient Greek name of a plant growing near Opous in Boeotia.) About 130 species in N. C. and S. Am.

A. Joints flat, 5–14 cm. long.
  B. Spines wanting or few: fls. 5–8 cm. broad, yellow....1. *O. humifusa*
  BB. Spines numerous, brown.
    C. Fr. fleshy: joints 10–14 cm. long; spines 1–6 in each areola....2. *O. phaeacantha*
    CC. Fr. dry; joints 5–12 cm. long; spines up to 15 in each areola.
      D. Fls. yellow....3. *O. polyacantha*
      DD. Fls. red....4. *O. rhodantha*
AA. Joints tumid, fragile, 3–5 cm. long....5. *O. fragilis*

1. **O. humifûsa** Raf. Prostrate; joints usually resting on the ground and rooting on the lower margin, obovate to suborbicular, 5–10 cm. long, thick, pale green; areolae with grayish wool and a few short greenish yellow bristles; spines usually wanting or only 1, stout, less than 2.5 cm. long, yellow or variegated; lvs. thick, 4–5 mm. long: fls. pale yellow, about 5 cm. broad: fr. obovoid or clavate-obovoid, 2–3 cm. long, red; seeds thick-margined. Fl.VII–VIII. B.M.2393,7041(c). Add.3:t.105(c). Gn.20:548,t(c). M.A.1:t.61(c). Gs.4:123(h). (*O. vulgaris* Haw., not Mill., *O. mesacantha* Raf., *O. compressa* Macbr., *O. Rafinesquei* Engelm., *O. Opuntia* Coult.) Mass. to Ga. and Ala., w. to Mo. and Tenn. Cult. 1596. Zone V.

2. **O. phaeacántha** Engelm. Prostrate; joints rooting at the lower margin, broad-obovate to orbicular, 10–15 cm. long, moderately thick; areolae about 2.5 cm. apart, with light brown wool and yellowish brown bristles; spines usually 1–3, sometimes 3–6, sometimes to 6 cm. long, mostly on marginal areolae, reddish brown with lighter tips: fls. 6–8 cm. across, yellow with reddish centre: fr. ovoid to globose, sometimes pyriform, about 3 cm. long, red, sweet. B.B.2:572. Gs.4:123. RepR. R. Miss. Pacif.4:t.9.f.1–5,t.22. Ariz. and Tex. Cult. 1885. Zone VII?

3. **O. polyacántha** Haw. Prostrate, wide-spreading; joints obovate to orbicular, 5–10, rarely to 15 cm. long, often wrinkled and tuberculate, bright green; areolae about 1 cm. apart, with short grayish wool and reddish brown bristles, all armed; spines numerous, variable, lateral ones 5–10, slender, mostly whitish, variegated with red, not exceeding 1.5 cm., central ones 0–5, stout, to 5 cm. long, usually reddish brown with pale tips: fls. yellow or orange-yellow, darker in centre, 5–6 cm. across: fr. obovoid or subglobose, 2–2.5 cm. long, armed with numerous short spines, dry; seeds 5–6 mm. broad, irregular. Fl.V–VI. B.M.7046(c). G.C.III.28:413;50:340. B.B.2:573. (*O. missouriensis* Engelm.) Alb. and N. D. to Okla., Tex. and Utah. Cult. 1814. Zone V.

4. **O. rhodántha** K. Schum. Prostrate and ascending; joints obovate to obovate-oblong, 7–12 cm. long, slightly tuberculate, deep green; areolae with grayish wool and reddish brown bristles; spines 2–4, to 3 cm. long, grayish, and usually a few smaller ones: fls. 6–7 cm. long and 5.5 cm. broad; petals carmine-red; filaments red, anthers yellow, ovary scaly and bristly. M.M.7: 133. Britton & Rose, Cact.t.35,f.2(c). Colo. Intr. about 1895. Zone VI?—Var. **xanthostémma** Rehd. Joints tuberculate: fls. carmine-red; filaments yellow below, red above. Gn.58:67. G.W.1:83. (*O. x.* K. Schum.) Colo. Intr. about 1895. Zone VI?

5. **O. frágilis** Haw. Prostrate, to 10 cm. high; joints tumid, nearly as thick as broad, subglobose to ellipsoidal, 2–5 cm. long, easily detached, bright

green; areolae 6–10 mm. apart, with whitish wool and a few white to yellow bristles; spines 1–4 and occasionally a few smaller ones, weak, the upper ones usually longer and stronger, rarely to 2.5 cm. long, dark brown: fls. greenish yellow, 2.5–3 cm. across: fr. ovoid to subglobose, 2–2.5 cm. long, dry, with a few spines. B.B.2:573. Fl.VII–IX. B. C. and Wisc. to Ariz. and Tex. Intr. 1814. Zone V.—Var. **brachyárthra** Coult. Joints ellipsoid, with more and stronger spines: fls. small: fr. more spiny. Gt.30:413. N.I.2:502. (*O. b.* Engelm.) Colo. to N. Mex. Cult. 1881.

75. THYMELAEACEAE Reichb. MEZEREUM FAMILY

Shrubs or trees, rarely herbs: lvs. alternate, rarely opposite, simple, entire, exstipulate: fls. perfect or unisexual, regular, usually in terminal spikes, panicles or clusters, sometimes axillary; usually a short or elongated, often colored, calyx-tube bearing at apex 4–5 imbricate, often petaloid, sepals and as many petals or the latter wanting; stamens 4–5 or 8–10, rarely 2; ovary superior, 1-celled, rarely 2-celled; ovule solitary, pendulous; style 1, stigma usually capitate, sometimes sessile: fr. a nut, drupe or berry, rarely a caps.; seed albuminous or exalbuminous; embryo straight with thick cotyledons.—About 40 genera and 450 species widely distributed in both hemispheres.

A. Stamens not exserted; style short or wanting; fls. often in terminal clusters or panicles.
B. Fls. in terminal or lateral heads or clusters, often with bracts; disk wanting or ring-like or of 1 lateral entire scale: lvs. usually alternate ..... 1. *Daphne*
BB. Fls. in terminal spikes, often panicled, without bracts, yellow or whitish; with 1 or more usually dentate disk-scales: lvs. usually opposite ..... 2. *Wikstroemia*
AA. Stamens and style exserted: fls. yellow, with indistinct limb, in few-fld. lateral clusters before the lvs. ..... 3. *Dirca*

1. DAPHNE L. Deciduous or evergreen shrubs; winter-buds small, with several outer scales: lvs. alternate, rarely opposite, short-petioled, entire: fls. perfect, apetalous, in terminal or axillary short racemes or umbels, usually with bracts; calyx-tube (receptacle) campanulate to cylindric, 4- or rarely 5-lobed, corolla-like, usually pubescent outside; stamens 8 or 10 in two rows, included; stigma capitate, sessile or on a short style; ovary without disk at base, or a ring-like disk or 1 entire scale: fr. a leathery or fleshy 1-seeded drupe. (*Daphne*, Greek name of *Laurus nobilis*.) About 50 species in Eu. and Asia.

A. Fls. axillary.
B. Lvs. deciduous: fls. before the lvs.
C. Lvs. opposite, silky below: fls. lilac. (Sect. GENKWA Benth. & Hook.) ..... 1. *D. genkwa*
CC. Lvs. alternate, glabrous: fls. rosy-purple to white. (Sect. MEZEREUM Spach.) ..... 2. *D. Mezereum*
BB. Lvs. evergreen.
C. Fls. in sessile racemes: lvs. oblanceolate ..... 3. *D. Laureola*
CC. Fls. in long-peduncled clusters: lvs. obovate to oblong-obovate ..... 4. *D. pontica*
AA. Fls. in terminal heads. (Sect. DAPHNANTHES C. A. Mey.)
B. Lvs. deciduous: fls. without bracts, white to yellow.
C. Lvs. glabrous.
D. Fls. yellow, glabrous ..... 5. *D. Giraldii*
DD. Fls. white, pubescent outside ..... 6. *D. altaica*
CC. Lvs. pubescent: fls. white ..... 7. *D. alpina*
BB. Lvs. evergreen.
C. Corolla densely pubescent outside.
D. Habit upright; shrub to 1 m.: lvs. elliptic to oblong, often pubescent.
E. Lvs. minutely whitish punctulate, usually acute: fls. without bracts. ..... 8. *D. oleoides*
EE. Lvs. not punctulate, usually obtuse: fls. with bracts ..... 9. *D. collina*
DD. Habit procumbent or very dwarf: lvs. linear to oblanceolate, glabrous.
E. Lvs. 8–12 mm. long: dwarf gnarled shrub to 15 cm. tall ..... 10. *D. petraea*
EE. Lvs. 1–2.5 cm. long: shrub with slender procumbent stems ..... 11. *D. Cneorum*
CC. Corolla glabrous or sparingly puberulous outside (see also species under No. 11).
D. Lvs. obtuse or obtusish: brts. glabrous.
E. Lvs. less than 5 cm. long: low diffusely branched shrub (see also *D. glomerata* under no. 4) ..... 12. *D. Blagayana*
EE. Lvs. more than 5 cm. long: upright shrub ..... 13. *D. odora*
DD. Lvs. emarginate: young brts. strigose-pubescent ..... 14. *D. retusa*

1. **D. génkwa** Sieb. & Zucc. Shrub to 1 m., with slender upright brs. silky-pubescent when young: lvs. opposite or occasionally alternate, elliptic-oblong, 3–5 cm. long, acute, silky-pubescent on the veins beneath: fls. lilac, 1.2 cm. across, scentless, 3–7 in short-stalked clusters; tube slender, about 1 cm. long, silky-pubescent outside. Fl.IV–V. S.Z.1:t.75(c). Gt.15t.499(c). R.B.10:73. Gn.42:94,t(c). China; cult. in Japan. Intr. 1843. Zone (V),VI. —Var. **Fortùnei** Franch. Lvs. often alternate: fls. larger. F.S.3:t.208(c). (*D. F.* Lindl.)

2. **D. Mezèreum** L. MEZEREUM. Upright shrub to 1 m., with stout glabrous brs.: lvs. alternate, oblong to oblanceolate, 3–8 cm. long, obtuse to acute, cuneate at base, grayish green beneath, glabrous: fls. long before the lvs., in sessile clusters of usually 3, lilac-purple or rosy-purple, 1.2 cm. across, very fragrant; tube silky-pubescent outside, 6 mm. long: fr. subglobose, 8 mm. across, scarlet. Fl.III–IV; fr.VIII–IX. R.I.11:t.556(c). F.D.10:t.976(c). Gn.29:602,t(c);33:514;86:659(h). S.L.199(h). Eu. to Cauc. and Altai; occasionally naturalized in the N. E. States. Cult. 1561. Zone IV.—Var. **alba** West. Fls. white; fr. yellow. Gn.29:602,t(c);80:104(h). G.C.III.21:183(h), 185. R.H.1905:532.—Var. **plèna** Schneid. Fls. white, double. (Var. *fl. albo pleno* Hort.) Gn.29:602,t(c).—Var. **grandiflòra** Dipp. Fls. larger, bright purple, from Oct. to Feb. (Var. *autumnalis* Hort.)—Planted for its early fragrant fls. and conspicuous scarlet fr.

D. M. × *Laureola* = *D. Houtteana;* see under No. 3.

Related species with yellow fls. are: **D. pseudo-mezèreum** Gray. Low, sometimes procumbent shrub: lvs. oblong to oblong-oblanceolate, acutish: fls. greenish yellow; sepals ovate, obtuse. C. Japan. Cult. 1905. Zone V?—**D. kamtschática** Maxim. Low shrub: lvs. oblong-obovate, obtuse: fls. yellow; sepals ovate to lanceolate, acute. N. E. Asia, Korea. Cult. 1912. Zone IV?

3. **D. Lauréola** L. SPURGE LAUREL. Bushy shrub to 1 m.; glabrous: lvs. oblanceolate, 5–8 cm. long, acute, gradually narrowed at base, dark green and lustrous above, light green beneath: fls. in 5–10-fld. nearly sessile racemes, yellowish green, 8 mm. long, scentless or sometimes fragrant: fr. ovoid, bluish black. Fl.III–V. R.I.11:t.555(c). F.D.10:t.977(c). Gn.29:602. G.C.III.77: 218. S.L.32(h). S. Eu., W. Asia. Cult. 1561. Zone VI?—Var. **Philíppii** Meisn. Dwarf; lvs. obovate, 2–5 cm. long: fls. often violet outside, smaller, fragrant. (*D. P.* Gren.) Pyrenees. Cult. 1894.

D. L. × *Mezereum* = **D. Houtteàna** Planch. Upright shrub to 1 m., with stout brs.: lvs. half-evergreen, oblong-lanceolate, purplish: fls. lilac-violet in short-stalked clusters. F.S.6:t.592(c). (*D. Mezereum* var. *atropurpurea* Dipp., *D. Laureola* var. *purpurea* Hort.) Orig. before 1850.

4. **D. póntica** L. Shrub to 1.5 m.; glabrous, usually with a single stem at base, much branched at the top: lvs. obovate to obovate-oblong, 5–8 cm. long, acute, narrowed toward the base, lustrous above: fls. in long-peduncled 1–3-fld. racemes, greenish yellow, fragrant; tube 8 mm. long; lobes linear-lanceolate. Fl.IV–V. B.M.1282(c). G.C.III.77:219. B.S.1:473. G.W.5:261 (h). Asia Minor. Intr. 1752. Zone VI.

A related species is **D. glomeràta** Lam. Low shrub; glabrous: lvs. obovate-lanceolate, 1.5–3 cm. long: fls. light pink, 1.2 cm. across, in 2–6-fld. racemes, crowded into a terminal head. S.H.2:f.267a-d. Asia Minor. Intr.?

5. **D. Giráldii** Nitsche. Upright shrub to 50 cm. or more; glabrous: lvs. crowded at end of brts., oblanceolate, 3–6 cm. long, acute to obtuse and mucronate, glaucescent below: fls. yellow, glabrous, slightly fragrant, on short glabrous pedicels in 3–8-fld. terminal heads without bracts; tube 6–8 mm. long; lobes acute, about half as long as tube: fr. ovoid, scarlet. Fl.VI: fr.VII. B.M. 8732(c). N. W. China. Intr. 1910. Zone V.

6. **D. altâica** Pall. Low upright shrub, much-branched; brts. glabrous: lvs. narrow-oblong to oblanceolate, 3–6 cm. long, acute, cuneate, dull green, glaucescent beneath, glabrous: fls. white, fragrant, in terminal clusters of 6–10; tube slender, 8 mm. long, puberulous outside; lobes ovate-lanceolate, obtuse; ovary glabrous: fr. ovoid, yellowish red. Fl.v–vi. B.M.1875(c). L.B.399(c). G.O.t.13(c). Gt.12:t.409(c). Altai, Songaria. Intr. 1796. Zone V.

Closely related species are: **D. caucâsica** Pall. Shrub to 2 m.: lvs. lanceolate or oblanceolate, 3–4 cm. long, obtuse, rarely acuminate, glaucescent beneath: fls. white, silky outside, in 15–20-fld. heads; ovary puberulous at apex. B.M.7388(c). Cauc. Cult. 1893. Zone VI?—**D. Sóphia** Kal. Lvs. oblong-ovate, obtuse or acuminate: fls. white, appressed-puberulous, in 6–15-fld. heads; sepals oblong-ovate, acute. Bull. Soc. Nat. Moscou,22:t.3. Russia. Cult. 1895. Zone V.

7. **D. alpîna** L. Dwarf shrub to 15 cm.; brts. pubescent: lvs. often crowded toward the end of brts., obovate to oblong-obovate, 1–4 cm. long, obtuse or acutish, cuneate, grayish green, pubescent on both sides: fls. white, fragrant, in terminal clusters of 6–10; tube 8 mm. long, silky outside; lobes ovate-lanceolate, acute; ovary pubescent: fr. oblong-ovoid, red, slightly pubescent. Fl.v–vi. R.I.11:t.553(c). F.D.10:t.978(c). L.B.66(c). Gn.29:603. Eu. Alps. Intr. 1759. Zone V.

8. **D. oleoîdes** Schreb. Shrub to 1 m.; brts. pubescent: lvs. elliptic-obovate to obovate-lanceolate, 2.5–3.5 cm. long, acute or obtuse and mucronulate, villous-pubescent on both sides or finally glabrous above, minutely whitish dotted beneath, less so above: fls. white to pale lilac, whitish pubescent outside, 1.2–1.5 cm. long, in 3–8-fld. heads, without bracts; lobes ovate to lanceolate, acute: fr. red. Fl.v–vi. R.I.11:t.553(c). S.F.t.357(c). S.L.176(h). (*D. buxifolia* Vahl, *D. glandulosa* Bertol.) Mediterr. region. Intr. 1815. Zone VIII?

9. **D. collîna** Smith. Shrub to 1 m.; brts. villous: lvs. oblong-obovate to oblanceolate, 2.5–4 cm. long, obtuse or obtusish, glabrous and lustrous above, tomentose beneath: fls. rose-purple, about 1 cm. across, in 10–15-fld. heads, with tomentose oval bracts half as long as calyx-tube; lobes oval, obtuse, nearly as long as tube; ovary silky. Fl.v–vi. B.M.428(c). B.R.24:56(c). R.I.11:t.544(c). F.D.10:t.980(c). Italy, Asia Minor. Intr. 1752. Zone VIII?—Var. **neapolitâna** Lindl. Brts. slightly pubescent: lvs. glabrous, glaucous beneath and slightly hairy toward the base: fls. rosy-purple, fragrant. L.B.719(c). B.R.822. (*D. n.* Lodd.)—Sometimes considered a hybrid between *D. collina* and *D. Cneorum*, but Keissler states that the var. occurs through the entire range of the species. Possibly *D. Fioniana* Hort. is such a hybrid.

D. c. × *odora* = *D. hybrida;* see under No. 13.

10. **D. petraèa** Leyb. Low much-branched shrub to 15 cm. high; brts. slightly puberulous: lvs. crowded, sessile, linear-spatulate, 8–12 mm. long, acutish or obtuse, glabrous, coriaceous: fls. rosy-pink, fragrant, 8 mm. across, puberulous, in 3–5-fld. clusters, tube slender, 1 cm. long; sepals ovate, obtuse. Fl.vi. Gn.87:255;89:227(h). Flora,38:t.13. Gs.3:104,t(hc). (*D. rupestris* Facch.) S. Tyrol. Cult. 1894. Zone V.

A related species is **D. arbúscula** Celak. Dwarf shrub; young brts. red: lvs. oblanceolate, 1.5–2.3 cm. long, obtuse, with revolute margin, grooved above, puberulous or glabrous beneath: fls. rosy-pink, tube 1.5 cm. long, appressed-puberulous. G.C.III.57:268. Gn.79:260. J.L.41:f.93. Hungary. Intr. before 1915? Zone V?

11. **D. Cneòrum** L. Procumbent shrub with slender trailing and ascending brs.; young brts. pubescent: lvs. crowded, oblanceolate, 1–2 cm. long, usually obtuse and mucronulate, cuneate, dark green and lustrous above, glaucescent

beneath, glabrous: fls. bright rosy-pink, 1 cm. across, fragrant, sessile in 6–8-fld. heads; tube 6–7 mm. long, grayish puberulous outside; sepals ovate, obtuse; bracts spatulate, obtuse, leafy: fr. yellowish brown. Fl.IV–V. B.M.313(c). R.I.11:t.554(c). L.B.1800(c). R.H.1917:252,t(c). G.C.III.69:312(h). Gn. 88:182(h). M.G.1900:417, 418(h). S.L.58(h). Mts. of C. and S. Eu. Intr. 1752. Zone V.—Var. **major** Dipp. Of more vigorous growth, with larger fls. Gn.51:358;65:457(h).—Var. **Verlòti** Meisn. Lvs. linear-lanceolate, 1.5–2.5 cm. long, acute; sepals lanceolate, obtusish; bracts acute. R.H.1901:304, 305;1902:552,t(c). (*D. V.* Gren. & Godr.) France, Switzerl., Germany. Cult. 1894. Zone V.—The best of the evergreen Daphnes, forming a dense mat covered with fragrant fls. in spring.

Related species are: **D. striàta** Tratt. Dwarf shrub; brts. glabrous: lvs. oblanceolate, crowded at end of brts.: fls. glabrous, rosy-pink, in 8–12-fld. heads; tube somewhat funnelform, slightly striate. Fl.VI–VII. R.I.11:t.554(c). F.D.10:t. 981(c). Eu. Alps. Cult. 1827. Zone V.—**D. aurantíaca** Diels. Shrub to 1.2 m.; brts. glabrous: lvs. elliptic or obovate to elliptic-oblong, 1–1.5 cm. long, acute, glabrous: fls. terminal and axillary, 2–4, sessile, glabrous, orange-yellow, fragrant; tube 1 cm. long; lobes elliptic-ovate, obtuse; ovary glabrous. S. W. China. Cult. 1924.

12. **D. Blagayàna** Frey. Low diffusely branched shrub, glabrous: lvs. crowded at end of brts., obovate to oblong-obovate, 2.5–4 cm. long, rounded at apex, cuneate; fls. white or yellowish white, 1.2 cm. across, fragrant, in 10–15-fld. heads, with oblong-obovate to lanceolate silky bracts; tube 1.5–1.8 cm. long, sparingly puberulous outside: lobes broad-ovate: fr. globose, pinkish white. Fl.IV–V. R.I.11:t.555(c). B.M.7579(c). Gt.29:t.1020(c). G.C.III. 32:300, 301(h). Gn.71:7(h),247;88:183(h). S.L.84(h). Mts. of S. E. Eu. Intr. 1875. Zone V.

13. **D. odòra** Thunb. Upright shrub to 2 m.; glabrous: lvs. elliptic-oblong, 5–8 cm. long, narrowed at ends, bluntly pointed, dark green above: fls. rosy-purple, fragrant, about 1.5 cm. across, glabrous, in dense terminal peduncled heads; bracts lanceolate, acute, sparingly ciliate, persistent, as long as the calyx-tube; ovary glabrous. Fl.III–V. B.M.1587(c). Smith, Exot. Bot.t.47 (c). Gn.28:8,t(c). Japan, China. Intr. 1771. Zone VIII?—Varies with white and spotted fls.

D. o. × *collina* = **D. hýbrida** Lindl. Similar to *D. odora:* lvs. elliptic-oblong, 4–8 cm. long, glabrous or slightly hairy on the veins beneath: fls. reddish purple, pubescent outside, very fragrant. B.R.1177(c). (*D. Delphinii* Hort., *D. Dauphinii* Hort.) Orig. about 1820. Zone VIII?

14. **D. retùsa** Hemsl. Shrub to 1 m., densely branched; young brts. densely yellowish strigose: lvs. oblong to oblong-oblanceolate, 2.5–7 cm. long, obtuse and usually emarginate, cuneate, with revolute margin, glabrous: fls. white inside, rosy-purple outside, 2 cm. across, fragrant, glabrous, on short tomentose pedicels in many-fld. terminal heads; tube 1.5 cm. long; lobes ovate, slightly shorter than tube; bracts obovate or oval, ciliate, deciduous: fr. red. Fl.v. B.M.8430(c). B.S.1:474. W. China. Intr. 1901. Zone VI or VII.

A related species is **D. tangùtica** Maxim. Young brts. slightly strigose, becoming glabrous: lvs. 3–7.5 cm. long, oblanceolate to elliptic-oblong: fls. rosy-purple outside, 1.2 cm. across; lobes ovate, obtuse, less than half as long as tube, white inside, stained purple toward the tips; tube 1.5 cm. long. B.M.8855(c). N. W. China. Intr. 1914. Zone VI?

2. **WIKSTROÈMIA** Endl. Deciduous or evergreen shrubs or small trees: lvs. opposite or sometimes alternate: fls. perfect, apetalous, in terminal spikes or racemes, often paniculate; bracts wanting; receptacle cylindric, slender, usually pubescent outside; sepals 4, rarely 5; stamens twice as many as sepals,

in two whorls; ovary sessile, pubescent; stigma capitate, subsessile; 1–4 connate or distinct, often toothed disk-scales at base of ovary: fr. a drupe. (After Johan Emanuel Wikstroem, Swedish botanist; 1789–1856.) About 35 species in E. Asia, Malaysia and Australasia.—Of little ornamental merit.

W. chamaedáphne Meisn. Upright shrub to 50 cm. or more, with slender red-brown glabrous brs.: lvs. opposite or subopposite, oblong-lanceolate to lanceolate, 2–6 cm. long, acute or acutish, narrowed into a very short petiole, pale green beneath, glabrous: fls. small, yellow, subsessile, silky outside, in dense peduncled spikes 0.5–4 cm., rarely to 10 cm. long, usually 3 or more forming terminal panicles; tube slender 6–8 mm. long; sepals oval, obtuse, ¼ as long as tube. Fl.VII–IX. N. China. Intr. 1910. Zone V.—Apparently difficult to cultivate and short-lived; probably best suited for a sunny rockery.

3. **DIRCA** L. Deciduous shrubs; winter-buds small, conical, enclosed by the base of the petiole before leaf-fall: lvs. alternate, membranous: fls. perfect, apetalous, in 2–3-fld. clusters axillary on last year's brts., before the lvs;. receptacle narrow-funnelform, indistinctly 4-lobed, deciduous; stamens 8, with filiform filaments exceeding the tube: ovary sessile, glabrous; style slender as long as stamens, with small stigma: fr. a drupe; seed with bony testa, exalbuminous; embryo with fleshy cotyledons. (*Dirke*, Greek mythological name.) Two species in N. Am.

D. palústris L. LEATHERWOOD. Shrub to 2 m., often with a short single stem; brs. flexible, with very tough bark, having the appearance as if jointed; brts. glabrous: lvs. short-petioled, elliptic to obovate, 3–7 cm. long, obtuse, cuneate, light green above, glaucescent beneath and pubescent when young: fls. short-stalked, pale yellow, 6–8 mm. long: fr. ellipsoid, 8 mm. long, pale green or reddish. Fl.III–IV; fr.V–VI. M.A.2:t.146(c). B.R.292(c). G.O.t. 49(c). G.C.III.69:196, 197(h). S.L.188(h). (Moose-wood, Wicopy.) N. B. and Ontario to Fla. and Mo. Intr. 1750. Zone IV.—Interesting shrub valued for its early fls.

Fam. 76. ELAEAGNACEAE Lindl. OLEASTER FAMILY

Trees or shrubs covered more or less with peltate or stellate silvery or brown scales: lvs. alternate or opposite, entire, exstipulate: fls. perfect or unisexual, regular, apetalous, axillary; calyx-tube (receptacle) with a prominent perigynous disk, developed beyond the ovary, persistent and enclosing the fr., or cup-shaped in the staminate fl.; calyx-lobes 4, rarely 2 or 6, valvate; stamens as many or twice as many as calyx-lobes, inserted in the tube; ovary superior, 1-celled and 1-ovuled; ovule erect, anatropous; style 1, with simple stigma: fr. drupe-like, consisting of the dry fr. proper enclosed by the usually fleshy calyx-tube; seed with bony testa, ex-albuminous or nearly so; embryo straight, with fleshy cotyledons.—Three genera with about 30 species in N. Am., Eu. and Asia s. to Malaysia.

A. Lvs. opposite; stamens 8: fls. dioecious, with 4 sepals.....2. *Shepherdia*
AA. Lvs. alternate: stamens 4.
B. Fls. dioecious; sepals 2; tube short: lvs. linear to lanceolate.....1. *Hippophae*
BB. Fls. perfect or polygamous; sepals 4; tube elongated much beyond the ovary: lvs. lanceolate to ovate .....3. *Elaeagnus*

1. **HIPPÓPHAË** L. Deciduous shrubs or trees with spiny brs.; the young growth covered with silvery scales or stellate hairs; winter-buds small, round, with few outer scales: lvs. alternate, short-petioled, narrow: fls. dioecious, axillary on last year's brs. in short racemes, the axis of which develops in the pistillate plant usually into brts. or thorns, but usually deciduous in the

staminate plant: staminate fls. sessile with reduced tube and 2 valvate sepals; stamens 4, with short filaments; pistillate fls. short-stalked, the calyx-tube with 2 minute lobes; style filiform with cylindric stigma: fr. drupe-like, with a bony ovoid stone. (*Hippophaës* is the ancient Greek name of a spiny plant.) Syn.: *Hippophaës* St.-Lag. Two species in Eu. and Asia.

H. rhamnoïdes L. Sea-Buckthorn. Shrub or tree to 10 m.; brs. gray, usually spiny; winter-buds golden-brown: lvs. linear to linear-lanceolate, 2–6 cm. long, acutish, covered on both sides with silvery-white scales, at maturity often glabrescent above: fls. before the lvs., very small, yellowish: fr. subglobose to ovoid, 6–8 mm. long, orange-yellow. Fl.III–IV; fr.IX(–III). B.M.8016(c). R.I.11:t.549(c). Gn.49:62,t(c);65:148(h);82:477. G.W.8:115, t(c);15:345(h). Eu. to Altai Mts., W. and N. China and N. W. Himal. Long cult. Zone (II).—Very attractive in fr.

A related species is **H. salicifòlia** D. Don. Tree to 15 m., with pendulous brs., less spiny; young shoots scaly and brownish villous: lvs. lanceolate, to 1 cm. broad, acute, dull green above, stellate-tomentose below, the midrib brown: fr. yellow. S.H.2:f.277k-l,278e-f. M.D.1918:t.27(h). S.L.10(h). Himal.: Kumaon to Sikkim. Intr. 1822. Zone VII?

2. **SHEPHÉRDIA** Nutt. Deciduous or evergreen shrubs; winter-buds with 1 or 2 pairs of outer scales: lvs. opposite, petioled: fls. dioecious, small, nearly sessile, in short axillary spikes or the pistillate often solitary; calyx of staminate fls. 4-parted, with 8 stamens alternating with 8 lobes of the disk; the pistillate with urn-shaped 4-cleft calyx enclosing the ovary, the orifice closed by the lobes of the disk; style slender with 1-sided stigma: fr. drupe-like, ovoid. (After John Shephard, once curator of the Liverpool Botanic Garden; 1764–1836.) Syn.: *Lepargyraea* Raf. Three species in N. Am.; the evergreen *S. rotundifolia* Parry from Utah not in cult.

A. Lvs. green and nearly glabrous above, silvery and scurfy with brown scales beneath. 1. *S. canadensis*

AA. Lvs. silvery on both sides. 2. *S. argentea*

1. **S. canadénsis** Nutt. Spreading unarmed shrub to 2.5 m., with brown scurfy brts.: lvs. elliptic to ovate, 2–5 cm. long, obtuse, green and sparingly scurfy above, silvery mixed with brown scales beneath: fls. yellowish about 4 mm. across: fr. ovoid, 4–6 mm. long, yellowish red, insipid. Fl.IV–V; fr. VI–VII. B.B.2:576. S.L.385(h). (*Lepargyraea c.* Greene.) Nfld. to Alaska, s. to Me., Vt., Mich., Wisc. and N. Mex. Intr. 1759. Zone I.—Var. **xantho-cârpa** Rehd. Fr. yellow. Intr. 1904.

2. **S. argéntea** Nutt. Buffalo-berry. Shrub or sometimes nearly tree-like, to 6 m., with often spiny spreading brs. silvery when young: lvs. oblong to oblong-lanceolate, 1.5–6 cm. long, obtuse, cuneate, silvery on both sides: fls. yellowish; fr. ovoid, 4–6 mm. long, scarlet, sour, edible. Fl.IV–V; fr.VIII. I.T.2:t.50. Gt.38:625. A.G.1900:827. B.B.2:577. S.L.385(h). (*Lepargyraea a.* Greene.) Minn. and Man. to Sask., Kans. and Nev. Intr. 1818. Zone I. —The fr. is made into jellies and conserves and the shrub used as a hedge plant in the northwest.

S. a. × *canadensis* = **S. gottingénsis** Rehd. The scales which are divided to the base in *S. canadensis* and merely dentate in *S. argentea* are divided about ½ to the middle in the hybrid. Orig. about 1892.

3. **ELAEÁGNUS** L. Deciduous or evergreen shrubs or trees, often spiny: winter-buds small, ovoid, with few outer scales: lvs. alternate, short-petioled, dotted with silvery or brown scales like other parts of the plant: fls. axillary, solitary or clustered, perfect or polygamous, apetalous; calyx-tube (receptacle)

campanulate or tubular, 4-lobed; stamens 4, on very short filaments, included: fr. drupe-like, with an ellipsoid striate stone (Greek *elaia*, olive, and *agnos*, the Greek name of *Vitex agnus-castus*). About 40 species in S. Eu., Asia and N. Am.—Grown as ornamental shrubs for their handsome foliage and decorative frs. and some for their edible frs.

A. Lvs. deciduous.
  B. Fr. mealy, yellow or silvery: lvs. silvery on both sides.
    C. Brts. silvery: style of perfect fls. enclosed at base by the tubular disk: fr. yellow. 1. *E. angustifolia*
    CC. Brts. brown: style not enclosed by a tubular disk: fr. silvery, dry....2. *E. argentea*
  BB. Fr. juicy, red-brown to pink, dotted with brown or silvery scales: lvs. often with brown scales beneath.
    C. Calyx-tube much longer than limb, gradually narrowed at base: fr. subglobose to ovoid, on a stalk 8–12 mm. long: brts. sometimes silvery....3. *E. umbellata*
    CC. Calyx-tube about as long as limb, abruptly contracted at base: fr. ovoid to oblong, on a stalk 1.2–2.5 cm. long: brts. brown....4. *E. multiflora*
AA. Lvs. persistent.
  B. Brts. and lvs. beneath silvery white....5. *E. macrophylla*
  BB. Brts. brown and lvs. dotted with brown scales beneath.
    C. Lvs. with yellow and brown scales beneath: brts. spineless....6. *E. glabra*
    CC. Lvs. whitish beneath, dotted with brown scales: brs. usually spiny....7. *E. pungens*

1. E. angustifòlia L. Oleaster. Shrub or small tree to 7 m., sometimes thorny; young brts. silvery: lvs. oblong-lanceolate to linear-lanceolate, 4–8 cm. long, acute to obtuse, usually broad-cuneate at base, dull green above, with silvery scales beneath; petiole 5–8 mm.: fls. 1–3, short-stalked, on the lower part of the brts., 1 cm. long, yellow inside, silvery outside, fragrant; calyx-tube campanulate, about as long as limb; style of the perfect fls. enclosed at base by a tubular disk: fr. ellipsoid, yellow, about 1 cm. long, yellow and coated with silvery scales, with sweet mealy flesh. Fl.vi; fr.viii–x. R.I.11:t.549(c). F.D.10:t.972(c). S.O.3:t.134, 135(c). S.H.2:f.279a-g. Gs.2: 37(b). S.L.12(h). (*E. hortensis* Bieb.) S. Eu. to W. and C. Asia, Altai and Himal. Long cult. in Eu. Zone V.—Var. **spinòsa** Ktze. Brs. usually spiny: lvs. broader, elliptic to elliptic-oblong, 3–7 cm. long, densely scaly: fr. smaller, subglobose to ellipsoid. B.R.1156(c). L.B.1339(c). (Var. *latifolia* Hort., *E. s.* L., *E. hortensis* var. *s.* Boiss.)—Var. **orientàlis** Ktze. Often spineless: brts. scaly and stellate-pubescent: lvs. elliptic to oblong, 3–7 cm. long, obtuse, usually rounded at base, dull green above, scaly and stellate-pubescent beneath; petiole 4–6 mm. long: fr. to 2 cm. long. A.G.21:405, 519, 613, 645. (*E. o.* L., *E. sativa* Hort.)

2. **E. argéntea** Pursh. Silver-berry. Upright shrub to 4 m., stoloniferous, unarmed, with reddish brown brts.: lvs. short-petioled, ovate to oblong or ovate-lanceolate, 2–10 cm. long, acute or obtuse, cuneate, silvery on both sides, sometimes with scattered brown scales beneath: fls. 1–3, short-stalked, yellow, silvery outside, 1.2–1.5 cm. long, fragrant: fr. broad-ellipsoid, 1 cm. long, silvery, with dry mealy flesh. Fl.v–vii; fr. ix–x. B.M.8369(c). B.B.2: 576. E. Can. to N. W. Terr., s. to Minn., S. Dak. and Utah. Intr. 1813. Zone I.

3. **E. umbellàta** Thunb. Shrub to 4 m., with spreading, often spiny brs.; brts. yellowish brown, often partly silvery: lvs. elliptic to ovate-oblong, 3–7 cm. long, obtuse to short-acuminate, rounded to broad-cuneate at base, often with crisped margin, usually with silvery scales above when young, sometimes glabrous, silvery beneath and usually mixed with brown scales: fls. yellowish white, fragrant, scaly outside, 1.2 cm. long; tube much longer than limb, gradually narrowed toward the base and slightly constricted; style scaly: fr. subglobose to ovoid, 6–8 mm. long, silvery mixed with brown scales at first, finally red, on stalks 8–12 mm. long. Fl.v–vi; fr.ix–x. S.I.2:t.54(c). R.H. 1901:85. M.G.14:569. A.G.12:206. China, Japan. Intr. 1830. Zone V.—

Var. **parvifòlia** Servettaz. Brts. and winter-buds silvery; lvs. elliptic-ovate to elliptic-lanceolate, usually short-acuminate, usually stellate-pubescent above, finally glabrous, silvery beneath: style stellate-pubescent: fr. short-stalked, subglobose, silvery, finally light red. Fr.VIII. B.R.29:51(c). Mn.5: 145. (*E. p.* Royle, *E. japonica* Hort.) Himal. Cult. 1843. Zone (V).

4. **E. multiflòra** Thunb. Shrub to 3 m., with spreading unarmed brs.; brts. reddish brown: lvs. elliptic or ovate to obovate-oblong, 2.5–6 cm. long, short-acuminate to obtusish, broad-cuneate, stellate-pubescent above, becoming glabrous, silvery beneath, with scattered larger brown scales: fls. 1–2, yellowish white, with silvery and brown scales outside; tube campanulate, distinctly constricted above ovary, about as long as limb: fr. oblong, about 1.5 cm. long, red, scaly, of pleasant acid flavor, pendulous on a slender stalk 1.5–2.5 cm. long. Fl.IV–V; fr.VI. B.M.7341(c). Add.4:t.155(c). G.F.1:499. M.G.16:573. A.G.1890:565. Gng.1:275, 277. (*E. longipes* Gray, *E. edulis* Hort.) China, Japan. Intr. 1862. Zone V.—Var. **ovàta** Servettaz. Lvs. stellate-pubescent above at first, soon glabrous: fls. 1–3: fr. ellipsoid, 8–12 mm. long, red with brown scales, nodding on pedicels 1.2–1.5 cm. long. Fr.VII–VIII. M.G.14:569 and G.C.III.66:301 (both as *E. multiflora*).—Var. **crìspa** Servettaz. Similar to the preceding: brts. often spinescent: lvs. oblong-lanceolate, often with crisped margin; pedicels as long as fr. (*E. longipes* var. *c.* Maxim.) Japan.

5. **E. macrophýlla** Thunb. Evergreen shrub to 3 m., with spreading unarmed brs.; brts. silvery white: lvs. broad-ovate or broad-elliptic, 5–11 cm. long, short-acuminate, rounded at base, scaly above, glabrescent at length, densely silvery-scaly beneath; petiole rather stout, about 1.5 cm. long: fls. 4–6, about 1 cm. long, fragrant, on stalks 6 mm. long, nodding, outside with silvery and brownish scales; tube campanulate, abruptly narrowed above the ovary, as long as limb: fr. ellipsoid, 1.5 cm. long, red, scaly. Fl.IX–XI; fr.v. B.M.7638(c). G.C.III.25:90. Gn.80:582. S.H.2:f.281a-c,282g-h. Japan. Intr. 1843. Zone VIII?

6. **E. glàbra** Thunb. Evergreen sarmentose or climbing shrub to 6 m., unarmed, very rarely spiny; brts. brown, lustrous: lvs. elliptic-ovate to elliptic-lanceolate, 3–7 cm. long, acutish to acuminate, broad-cuneate at base, lustrous above, with yellow and brown scattered scales beneath, lustrous; petiole 5–10 mm. long, brown: fls. short-stalked, white, brown outside, fragrant, narrowly funnelform; tube slender, gradually narrowed toward the base, twice as long as limb: fr. ellipsoid, 1.2–2 cm. long, gray or ferrugineous, on a stalk 4–10 mm. long. Fl.x–xi; fr.v. S.H.2:f.281i-l,282b-c. C. China, Japan. Cult. 1888. Zone VIII.

7. **E. pungens** Thunb. Spreading shrub, usually spiny, to 4 m.; brts. brown: lvs. elliptic to oblong, 5–10 cm. long, acutish to obtuse, rounded at base, with wavy and often crisped margin, scaly above at first, soon glabrous and lustrous, covered with dull white scales beneath and dotted with brown scales; petiole 6–12 mm. long, brown: fls. 1–3, pendulous, 1.2 cm. long, fragrant, silvery white, tube abruptly contracted above the ovary, longer than the limb: fr. ellipsoid, 1.5 cm. long, brown at first, finally red. Fl.x–xi; fr.v. S.H.2:f.281d-g,282a. Japan. Intr. 1830. Zone VII or VIII.—Var. **aùrea** Servettaz. Lvs. margined with deep yellow.—Var. **variegàta** Rehd. Lvs. margined with yellowish white. G.M.54:327.—Var. **Frederìci** Bean. Lvs. rather small and narrow, with pale yellow center and dark green narrow margin. (Var. *Frederici variegata* Rehd.)—Var. **maculàta** Rehd. With large deep yellow blotch in the middle. A.G.13:122. A.F.23:1015. (Var. *aureo-maculata* Hort., var. *aureo-variegata* Bean.)—Var. **Simònii** Nichols. Lvs.

rather large, elliptic-oblong, without or with few brown scales beneath. (*E. S.* Carr.)—Var. **trícolor** Nichols. Lvs. variegated with yellow and pinkish white. —Var. **refléxa** Rehd. Brs. elongated and less spiny: lvs. ovate-lanceolate, acute to acuminate, lustrous above, ferrugineous beneath. H.U.4:328,t(c). L.D.II.4:t.6(c). (*E. r.* Morr. & Dcne.)—Possibly hybrid between this species and *E. glabra.*

Fam. 77. **LYTHRACEAE** Lindl. LOOSE-STRIFE FAMILY

Herbs, shrubs or trees: lvs. opposite or whorled, entire, usually with small stipules: fls. perfect, usually regular, perigynous, in terminal or axillary racemes, panicles or cymes; calyx-tube (receptacle) tubular, usually ribbed; sepals 4 or 8, rarely to 16; petals as many, imbricated or wanting; stamens inserted below the petals, usually twice as many, sometimes fewer or more; ovary superior, with 1 style and an entire or slightly 2-lobed stigma, usually 2–6-celled, rarely 1-celled; ovules usually many, on axillary placentae: fr. a usually dehiscent caps.; seed exalbuminous; embryo straight, with flat or rarely folded cotyledons.—Twenty-two genera with about 450 species, mostly trop., few in temp. regions.

A. Lvs. lanceolate, often whorled: fls. in axillary clusters; petals 5; stamens 8–10. . 1. *Decodon*
AA. Lvs. elliptic to oblong, opposite or alternate above: fls. in terminal panicles; petals 6; stamens numerous. . . . . 2. *Lagerstroemia*

1. **DÉCODON** J. F. Gmel. Suffruticose plant: lvs. opposite or whorled, subsessile, entire, exstipulate: fls. in short-peduncled cymes in the axils of the upper lvs., trimorphous; calyx-tube campanulate, ribbed, sepals 5–7, with as many horn-like processes at the sinuses; petals lanceolate, crinkled; stamens 10, rarely 8, of 2 length, exserted; ovary 3–6-celled; style filiform; stigma capitate: caps. subglobose, loculicidal, 3–6-valved; seeds angled. (Greek *decas*, ten, and *odous* or *odōn*, tooth.) One species in N. Am.

D. verticillàtus L. Aquatic subshrub, with slender virgate curved angled brs., the submerged portion often spongy: lvs. elliptic-lanceolate to lanceolate, 3–20 cm. long, acuminate, cuneate, with often undulate margin: fls. in clusters of 2–8; petals rose-purple, 8–10 mm. long; caps. 5 mm. across. Fl.VII–IX. B.B.2:580. Torrey, Fl. N. Y.1:t.28(c). House, Wild Fl. N. York,1:t.143a(c). Mass. to Ont. and Minn., s. to Fla. and La. Intr. 1759. Zone IV.

2. **LAGERSTROÈMIA** L. Evergreen or deciduous shrubs or trees; winter-buds pointed, with 2 outer scales: lvs. opposite or the upper alternate, entire, with very small conical and deciduous stipules: fls. in terminal and axillary panicles, perfect, regular, pink, purple or white; pedicels bracted; calyx turbinate or hemispheric, often ribbed or winged; sepals 6–9; petals usually 6, with long and slender claw and crinkled or fringed blade; stamens many, with long filaments: ovary 3–6-celled, with a long style and capitate stigma; caps. loculicidal; seeds winged at the top. (After Magnus von Lagerstroem, a friend of Linnaeus; 1696–1759.) About 30 species in S. and E. Asia, New Guinea, Philipp. Isls., Australia.

L. índica L. Crape-Myrtle. Deciduous shrub or tree to 7 m.; brts. 4-angled, glabrous: lvs. subsessile, elliptic or obovate to oblong, 2.5–7 cm. long, acute or obtuse, broad-cuneate or rounded at base, glabrous or pilose along the midrib beneath: fls. bright pink, 3–4 cm. across, in panicles 6–20 cm. long; calyx smooth outside, not ribbed: fr. a broad-ellipsoid caps., 1–1.2 cm. long. Fl.VII–IX. B.M.405(c). R.H.1874:130,t(c). Gt.6:t.191(c). G.C.III.66:186 (h). Gng.1:151(h);5:281(h). China; much cult. in trop. and subtrop. coun-

tries. Intr. 1759. Zone VIII.—There is a form with white fls. (var. *alba* Nichols.) and one with purple fls. (var. *rubra* Lav.).—A very handsome shrub, much cult. for its profuse summer bloom in the southern Atlantic and Gulf states, hardy as far north as Baltimore; occasionally escaped.

Fam. 78. **PUNICACEAE** Horan. POMEGRANATE FAMILY

Only one genus which see for characters.

Pùnica L. Shrubs or small trees; winter-buds small, with 2 pairs of outer scales: lvs. usually opposite and fascicled, entire, exstipulate: fls. perfect, perigynous, 1–5 at end of brts., terminal and axillary; calyx-tube campanulate or tubular, sepals 5–8, fleshy, valvate; petals 5–7, imbricate; stamens very numerous; ovary inferior or nearly so with the carpels in 1 or 2 superimposed series, 3 with axillary placentae in the lower and usually 5–7 with parietal placentae in the upper whorl; style 1 with capitate stigma: fr. a berry, with thick leathery rind, the central pulpy mass formed by the fleshy outer seed-coats; embryo straight, with convolute cotyledons. (The ancient Latin name of the plant.) Two species in the Mediterr. region to the Himal. and in Socotra.

P. Granàtum L. POMEGRANATE. Deciduous shrub or small tree to 5, rarely 10 m., with spinescent brs.; brts. angled, glabrous: lvs. short-petioled, obovate to oblong, 2–8 cm. long, acutish, glabrous, lustrous above: fls. short-stalked, scarlet, about 3 cm. across; petals crumpled; calyx purple: fr. subglobose, 6–8 cm. across, deep yellow, crowned by the persistent calyx. Fl.v–vi; fr.ix–x. B.M.1832(c). E.N.III.7:24. S. E. Eu. to Himal. Cult. since time immemorial. Zone VIII.—Grown for its fls. and fr.—Many forms are known, most of them tenderer than the type.—Var. **plenifìora** Hayne. Fls. double, scarlet. Trew, Pl. Ehret.t.71(c). R.B.12,169,t(c).—Var. **albéscens** DC. Fls. white. A.R.t.96(c).—Var. **múltiplex** Sweet. Fls. white, double. R.B.12:169,t(c).—Var. **flavéscens** Sweet. Fls. yellow.—Var. **Legréllei** Vanhoutte. Fls. double, striped red and yellowish white. F.S.13:t.1385(c). R.H.1867:232,t(c);1880:130,t(c). I.H.5:t.156(c).—Var. **nàna** Pers. Low form with smaller linear-lanceolate to linear lvs., smaller fls. and fr. B.M. 634(c). L.B.988(c). A double-fld. form is var. **plèna** Voss.

Fam. 79. **NYSSACEAE** Endl. TUPELO FAMILY

Deciduous trees; winter-buds scaly: lvs. alternate, entire or toothed, exstipulate: fls. dioecious or polygamous, in axillary or terminal heads; calyx in the staminate fls. minute, 5-toothed or indistinct, in the pistillate fl. adnate to the ovary; petals 5 or more or wanting; stamens twice as many or fewer than petals, usually in 2 series; ovary 1-celled or 6–10-celled; ovules solitary, anatropous, pendulous; disk epigynous or wanting; style subulate or conic, with simple or divided stigma: fr. drupaceous, crowned with the remnants of the calyx; seed albuminous with thin or membranous testa; cotyledons foliaceous, radicle cylindric. The family is sometimes included in Cornaceae. Three genera in N. Am., W. China, Himal. and Malayan Archipelago.

A. Lvs. cuneate or rounded at base, entire or remotely dentate; infl. without bracts. 1. *Nyssa*
AA. Lvs. cordate at base, serrate-dentate: infl. with 2 large bracts. . . . . 2. *Davidia*

1. **NYSSA** L. TUPELO. Deciduous trees: winter-buds with imbricate scales: lvs. entire or remotely toothed: fls. minute, greenish white, polygamo-dioecious, in axillary peduncled clusters; the staminate in many-fld. peduncled clusters; calyx disciform or cup-shaped, 5-toothed; petals 5, small, ovate to

linear-oblong, inserted on the margin of the conspicuous disk; stamens 5–12, exserted; without rudimentary ovary; pistillate fls. sessile, rarely short-stalked, 1 or 2 to several, with bractlets at base, on slender or sometimes short peduncles; calyx-tube campanulate with 5-toothed limb; petals small; stamens 5–10, short, with often sterile anthers; disk less developed: ovary 1–2-celled, style terete, recurved, stigmatic on the inner face: fr. an oblong drupe, usually 1-seeded, with a bony, ribbed or winged stone; embryo straight. (Greek name of a nymph; alluding to the habitat of the trees, in swampy or moist soil.) Four species in N. Am. and 2 in Asia.

N. sylvática Marsh. Tupelo. Tree to 30 m., with slender spreading usually more or less pendulous brs. forming a flat-topped nearly cylindric or sometimes broad head: lvs. obovate or elliptic, 5–12 cm. long, acute or acuminate, cuneate or sometimes rounded at base, entire, rarely coarsely dentate, lustrous above, glaucescent beneath, pubescent on the veins or glabrous at maturity; petiole 6–35 mm. long, terete or wing-margined: fls. on pubescent or tomentose peduncles 1–3.5 cm. long; staminate pediceled, in many-fld. heads; pistillate in 2- or several-fld. clusters: fr. ovoid, 1–1.5 cm. long, blue-black, with thin acrid flesh; stone slightly 10–12-ribbed. Fl.v–vi; fr.x. S.S.5:t.217. Em.312,t.7(c). G.F.3:491(h);7:275(h). F.L.6:8,t(h). (*N. multiflora* Wangh., *N. villosa* Michx., *N. aquatica* L., partly.—Pepperidge, Black Gum, Sour Gum.) Me., Ont. and Mich. to Fla. and Tex. Intr. before 1750. Zone IV.—Ornamental tree of distinct habit, with handsome lustrous foliage turning bright scarlet in autumn.

Rarely cultivated and much tenderer are the following species: **N. biflòra** Walt. Closely related to the preceding species; rarely 10 m. tall: lvs. smaller, usually oblong, 4–10 cm. long, usually obtuse, glabrous at maturity, subcoriaceous; pistillate fls. in pairs: fr. ellipsoid, about 8 mm. long; dark blue; stone prominently ribbed. S.S.5:t.218. (*N. sylvatica* var. *b.* Sarg.) N. C. to Fla. and La. Intr. 1739? Zone VI or VII.—**N. sinénsis** Oliv. Tree to 15 m.; brts. pubescent: lvs. elliptic, 8–15 cm. long, dull dark green above, light green and pubescent on the veins beneath: pistillate fls. short-pediceled, few, on slender peduncles: fr. oblong, 1.2–1.5 cm. long, bluish. H.I.20:1964. C.C.259. C. China. Intr. 1902. Zone VII?—**N. aquática** L. Cotton Gum. Tree to 30 m.; brts. soon glabrous: lvs. ovate to oblong, 10–16 cm. long, acute or acuminate, entire or remotely toothed, lustrous above, glaucescent and downy-pubescent beneath: pistillate fls. solitary, with 2–4 bractlets at base, on slender hairy peduncles: fr. oblong, 2–2.5 cm. long, purple. S.S.5:t.220. (*N. uniflora* Wangh.) Va. to s. Ill., Fla. and Tex. Intr. before 1735. Zone VI or VII.—**N. ogèche** Marsh. Ogeechee Lime. Tree to 20 m.; brts. pubescent: lvs. elliptic to obovate-oblong, 10–14 cm. long, acute to obtuse, entire, at maturity slightly hairy and lustrous above, glaucescent beneath and fulvous-pubescent on the veins or sometimes nearly glabrous: pistillate fls. solitary, on short villous peduncles: fr. oblong, 1.2–1.6 cm. long, red. S.S.5:t.219. S. C. to Fla. Intr. 1806. Zone VIII.

2. **DAVÍDIA** Baill. Deciduous tree; winter-buds large, with several imbricate scales: lvs. alternate, slender-petioled, dentate, exstipulate: fls. andromonoecious, apetalous, in dense subglobose heads consisting of numerous staminate fls. and 1 perfect fl., with 2 large bracts at base; sepals and petals wanting; stamens 1–7, with slender filaments; ovary 6–10-celled, with rudimentary perianth and a circle of short stamens on top of the ovary at base of the short thick style; stigmas spreading: fr. a drupe, with 3–5-seeded stone. (After Armand David, French missionary who botanized in China from 1862–73.) One species in China.

D. involucràta Baill. Tree to 20 m. with upright and ascending brs., of the aspect of a linden: brts. glabrous: lvs. broad-ovate, 8–14 cm. long, acuminate, cordate, dentate-serrate with acuminate teeth, strongly veined, bright green

and finally glabrous above, densely silky-pubescent beneath; petiole 3.6–7 cm. long: fl.-heads 2 cm. across on slender peduncles about 7 cm. long and terminal on short lateral spurs; bracts 2, rarely 3, opposite, ovate to oblong-obovate, entire or serrate, creamy-white, the larger one to 16 cm. long, pendulous, the smaller about half as long: fr. pear-shaped, about 3.5 cm. long, green with purple bloom. Fl.v–vi; fr.x. Nouv. Arch. Mus. Paris,II.8:t.10(c). W. China. Intr. 1904. Zone VI or VII?—Var. **Vilmoriniàna** Wangerin. Lvs. glaucescent or yellowish green and glabrous beneath or only sparingly pubescent on the veins while young. B.M.8432(c). G.C.III.64:12,13,17(h);78:25(h). R.H. 1906:297–9(h). Gn.82:199. Gn.M.40:131. C. and W. China. Intr. 1897. Zone V. (*D. V.* Dode, *D. laeta* Dode.)—Pyramidal tree with handsome rather large bright green lvs. and of striking beauty when laden with the large creamy-white floral bracts.

Fam. 80. ALANGIACEAE Lindl. ALANGIUM FAMILY

The family contains only the following genus.

ALÀNGIUM Lam. Trees or shrubs, sometimes spiny: lvs. alternate, petioled, entire or lobed, estipulate: fls. perfect, regular, white or yellowish white, in axillary cymes with subulate or linear deciduous bracts; pedicels articulate; calyx-lobes 4–10, petals as many, linear or strap-shaped, valvate, sometimes coherent at base, at first tubular, later recurved; stamens as many as petals or 2 to 4 times as many; filaments free; disk large; ovary inferior, 1-, rarely 2-celled; ovule solitary, pendulous, anatropous; style cylindric, elongated, with entire or 2–3-lobed stigma: fr. an ellipsoid or globose drupe crowned by the calyx, 1-seeded; seed albuminous; embryo straight with foliaceous cotyledons and a long radicula. (Name an anagram of Adanson's name Angolam for this plant.) Syn.: *Marlea* Roxb. About 20 species chiefly in s. Asia extending to Japan, C. China, and Australasia; also in Africa.

A. platanifòlium Harms. Tree, but usually shrubby in cult.; brts. pubescent when young, soon glabrous: lvs. suborbicular to broad-ovate, 10–20 cm. long, 3–5-, rarely to 7-lobed, with oblong to triangular acuminate entire lobes, subcordate to broad-cuneate at base, palminerved, dark green above and sparingly pubescent beneath; petiole 2–7 cm. long: fls. 2.5–3 cm. long, fragrant, in 1–4-fld. peduncled cymes; petals linear, usually 6, coherent at base: fr. ovoid, 6–8 mm. long. Fl.vi–vii. E.P.IV.220b:23. (*Marlea platanifolia* Sieb. & Zucc.) C. China, Japan. Intr. 1867. Zone VIII.

A related species is **A. chinénse** Rehd. Lvs. ovate, usually oblique at base, 8–20 cm. long, entire or with few lobes and usually unsymmetrical, acuminate, glabrous above: cymes 3–15-fld.; fls. about 2 cm. long. B.R.24:61(c). E.P.IV. 220b:20. (*A. begoniifolium* Baill., *Marlea begoniifolia* Roxb.) C. China to S. Asia, Afr. Intr. 1805. Zone VIII?

Fam. 81. MYRTACEAE R. Br. MYRTLE FAMILY

Evergreen shrubs or trees, aromatic: lvs. usually opposite, entire, pellucid-dotted, exstipulate: fls. perfect, regular; sepals usually 4–5, imbricate, sometimes lid-like and deciduous; petals as many, imbricate; stamens numerous, often in fascicles opposite the petals; ovary inferior, 1- to many-celled; ovules 1 to many in each cell; style 1: fr. usually a berry or a caps., rarely a drupe or a nut; seeds often angled, exalbuminous.—About 70 genera and 2800 species in trop. and subtrop. regions.

EUCALÝPTUS L'Herit. Gum-tree. Evergreen trees, rarely shrubs: lvs. usually alternate and pendulous, petioled, rarely opposite and sessile, but

opposite and sessile in the juvenile stage of many species, penninerved, usually glabrous: fls. white to yellow or red, usually in axillary umbels, sometimes corymbose or paniculate; calyx-tube turbinate, campanulate or oblong, adnate to the ovary; calyx-lobes and petals connate into a lid or cap and separating from the calyx-tube at anthesis; stamens numerous; anthers opening by slits or pores: fr. a caps. opening at the top by 3–6 valves; seeds numerous, angled. (Greek *eu*, well, and *calyptein*, to cover; referring to the lid of the fl.) About 300 species in Australia and a few in Malesia.—Much planted in subtrop. countries for timber and ornament; the following may be precariously hardy at the southern limit of our area.

E. Gúnnii Hook. f. CIDER G. Tree to 25 m., sometimes shrubby: lvs. of young plants opposite or nearly so, orbicular, 2–6 cm. wide, rounded or emarginate at apex, short-petioled or sessile: lvs. of adult plant alternate, lanceolate, 5–10 cm. long, acute at ends; petiole to 2.5 cm. long: umbels 3-fld., short-stalked; fls. about 1.5 cm. across; lid hemispherical, short-pointed, lustrous; stamens yellow, 5–7 mm. long; anthers oval, opening by parallel slits: fr. turbinate, truncate, 6–10 mm. across. Fl.IX–X. G.C.III.2:781;11:787(h). Maiden, Crit. Rev. Eucal.3:t.108,f.2–8,t.9,f.1. S. Austral., Tasmania. Intr. about 1850. Zone VIII?—A variable species; the hardiest form is var. **montàna** Hook. f. Smaller tree: young lvs. sometimes perfoliate, adult lvs. usually smaller: fr. smaller, more hemispherical, with thinner rim. B.M. 7808(c, excl. f.3,4). B.S.1:534. Maiden,l.c.3:t.83,f.11(as *E. cordata*),t.108,f.1. (*E. Perriniana* F. v. Muell.)

Other comparatively hardy species are: **E. urnígera** Hook. f. Lvs. of young plants orbicular, 2–4 cm. across, crenulate, emarginate or mucronate, cordate; of adult plants ovate to lanceolate, 5–10 cm. long, cuneate or rounded at base: fls. usually 3 on a peduncle to 2.5 cm. long; calyx-tube urn-shaped: fr. short-urn-shaped, 1–2.5 cm. wide; valves sunk much below the mouth. G.C.III.3:799, 802. Maiden,l.c.t.80,f.13–15. Tasmania. Cult. 1850.—**E. coccífera** Hook. f. Lvs. of young plants opposite, sessile, roundish or oval, abruptly pointed, 2–3.5 cm. long, of adult trees alternate, lanceolate, 5–10 cm. long, often with slender mucro, thick, grayish green; petiole to 2.5 cm. long: fls. 5–7, nearly sessile, on a peduncle about 1 cm. long; calyx-tube angled; lid short and flat, rugose; anthers reniform, opening by divergent slits: fr. turbinate, 1–1.5 cm. across. B.M.4637(c). G.C.III:379, 801;9:169(h). Gn.71:591(h). R.H.1858:296. Maiden,l.c.t.28,f.3–5. Tasmania, Cult. 1850.—**E. coriàcea** A. Cunn. Large tree; juvenile lvs. roundish to ovate; mature lvs. alternate short-petioled, ovate-oblong to lanceolate, 10–16 cm. long, acuminate, with a filiform often hooked mucro, lustrous: fls. 5–8, on a stalk as long as petiole; lid hemispheric, obtuse or with short point, twice shorter than tube; anthers reniform: fr. pear-shaped, about 8 mm. across, not or slightly sunk at apex. Maiden l.c.1:t.26,27,28,f.1,2. Austral. Cult. 1902.—Var. **alpìna** F. Muell. Often shrubby: lvs. about 5 cm. long, nearly straight: fls. smaller. Maiden,l.c.t.27,f.6. Am.For.29: 465, 466(h). High Mts. up to the timber-line. Intr. 1923?—**E. cordàta** Labill. Small tree: lvs. opposite, sessile, orbicular to ovate, 3–8 cm. long, obtuse or mucronate, cordate at base, bluish white: fls. usually 3; lid depressed-hemispherical, obtuse or mucronate; stamens 8–10 mm. long; anthers opening by parallel slits: fr. globose-truncate. B.M.7835(c). G.C.III.3:803;30:456(h);47:168,t. Maiden, l.c.2:t.83,f.10,t.84,f.1–6. Tasmania. Cult. 1850.

Fam. 82. ONAGRACEAE Lindl. EVENING-PRIMROSE FAMILY

Herbs, rarely shrubs or trees: lvs. opposite or alternate or whorled, entire or toothed, rarely lobed; stipules small, deciduous or wanting: fls. perfect, regular, epigynous or perigynous, usually solitary or few, axillary, rarely in racemes or panicles; sepals 4, rarely 2 or 3; petals 4, rarely 2 or wanting, usually clawed, convolute; stamens usually twice as many as petals or as many, rarely fewer; ovary inferior, 2–4-celled; ovules numerous, rarely few, on axillar placentae; style 1 with 1–4 stigmas: fr. a caps., rarely a berry or a

nut; seeds small, exalbuminous. Syn.: *Epilobiaceae* DC.—About 36 genera with 500 species distributed through both hemispheres but most numerous in Am.—The genus *Zauschneria* sometimes considered woody is scarcely suffruticose and only precariously hardy within our area.

FÚCHSIA L. Shrubs or small trees, usually glabrous: lvs. opposite or sometimes whorled or alternate, petioled, dentate, with small caducous stipules: fls. axillary, 1 or several, peduncled and usually pendulous, sometimes forming terminal panicles; calyx-tube prolonged beyond the ovary and campanulate to tubular, with 4 spreading valvate lobes, usually colored, often red; petals 4, sometimes 5, rarely wanting, usually upright; stamens usually 8, often exserted; style exserted, with capitate, simple or 4-lobed stigma: fr. a 4-loculed, soft berry with numerous usually brown seeds. (After Leonard Fuchs, German physician and botanical author; 1501–65.) About 70 species in trop. and subtrop. Am., a few in New Zealand.—Even the hardier species can hardly be considered shrubby within our area, as they are killed to the ground even if protected, but the young shoots springing up from the base flower the same season.

F. magellánica Lam. Small shrub: lvs. short-petioled, ovate-oblong, 2.5–5.5 cm. long, acuminate, rounded at base, dentate or denticulate, slightly pubescent on margin and midrib beneath, bright green: fls. usually solitary, pendulous; calyx red, the tube cylindric, less than half as long as the oblong-lanceolate lobes; petals obovate, violet, half as long as calyx-lobes; stamens much exserted. Fl.VI–IX. B.M.97(c). S.H.2:f.285f-g,286c. (*F. coccinea* Curtis, not Ait., *F. macrostemma* Ruiz & Pav.) Peru, Chile. Cult. 1800. Zone VIII. A variable species.—Var. **globòsa** Bailey. Lvs. ovate, glabrous; petiole longer: fl. nearly globose in bud; calyx-tube very short, the lobes often cohering for some time at apex. B.R.1556(c). Gn.55:75. B.C.3:1299. S.H. 2:f.285i,286h. (*F. g.* Lindl., *F. macrostemma* var. *g.* Sweet.) Orig. 1830.—Var. **Riccartònii** Bailey. Lvs. oblong-ovate, with purplish tinge; calyx-tube short; lobes shorter and broader. R.H.1896:30; 1926:172,t(c). B.C.3:1300. (*F. R.* Tillery.) Cult. 1835.—Also *F. conica* Lindl. (*F. macrostemma* var. *c.* Sweet.), *F. corallina* Porcher, *F. tenella* Lindl. (*F. macrostemma* var. *t.* DC.), *F. elegans* Paxt., *F. exoniensis* Paxt. and *F. Thomsonii* Hort. are probably forms or hybrids of *F. magellanica.*

Other species of about the same hardiness are: **F. díscolor** Lindl. Dwarf and compact shrub; brts. deep purple, puberulous: lvs. oblong-ovate or narrow- elliptic, 2–4 cm. long, cuneate, remotely denticulate, glabrous or very sparingly hairy beneath; pedicels thin, puberulous, to 3 cm. long; tube about half as long as the narrow sepals; ovary often puberulous. B.R.1805(c). B.C.3:1300. S.H.2:f.285h; 286f-g. (*F. magellanica* var. *d.* Bailey.) Falkland Islands. Intr. before 1835. Zone VIII?—**F. grácilis** Lindl. Slender shrub; young brts. and young lvs. puberulous: lvs. oblong-obovate or elliptic-oblong, 3–5.5 cm. long, cuneate, dentate: petioles slender, to 1.5 cm. long: fls. usually solitary; calyx-tube cylindric, about 1.5 cm. long, more than half as long as the lanceolate sepals; pedicels slender, to 4 cm. long, puberulous like the ovary. B.R.847(c),1052(c). B.M.2507(c). Gn.55: 71. B.C.3:1301. (*F. magellanica* var. *g.* Bailey.) Mex. Intr. 1822. Zone VIII? —**F. microphýlla** Kunth. Dwarf shrub; brts. puberulous: lvs. broad-elliptic to ovate, 5–15 mm. long, glabrous: fls. polygamous, without the ovary 1–1.3 cm. long; calyx-tube longer than the ovate lobes, deep pink; petals rose-purple; fr. subglobose, 3 mm. across. B.R.1269(c). L.B.1545(c). S.H.2:f.285c-d. Mex. Intr. 1825. Zone VIII?

Fam. 83. ARALIACEAE Vent. GINSENG FAMILY

Shrubs, trees or herbs, often prickly, sometimes climbing; stems usually with large pith: lvs. alternate, entire, lobed or compound; stipules present or

wanting: fls. regular, small, perfect or unisexual, epigynous, usually in umbels often forming compound infl. sepals minute or obsolete; petals 5, rarely more, valvate or imbricate, sometimes cohering at apex and falling off as a cap; stamens usually 5, inserted at the edge of the disk; ovary inferior, 2–15-celled; cells 1-ovuled; styles as many as carpels, often connate: fr. a berry, rarely splitting into segments; seeds albuminous, with small embryo. Syn. *Hederaceae* L.—About 50 genera and more than 500 species in the trop. and temp. regions of both hemispheres.

A. Lvs. simple or digitate; petals valvate.
  B. Stems climbing by rootlets, unarmed: lvs. simple or lobed, persistent.....1. *Hedera*
  BB. Stems upright, usually prickly: lvs. simple or digitate, deciduous.
    C. Styles 2, distinct: lvs. palmately lobed, prickly on both sides; stem densely prickly. 2. *Echinopanax*
    CC. Styles 2–5, more or less connate: lvs. digitate or palmately lobed; stems prickly or unarmed.....3. *Acanthopanax*
AA. Lvs. pinnately compound: infl. large, paniculate; petals valvate: stem prickly...4. *Aralia*

1. **HÉDERA** L. Ivy. Evergreen shrubs climbing by aërial rootlets; winter-buds ovoid, with several outer scales: lvs. alternate, petioled, entire, coarsely dentate or lobed: fls. perfect, in umbels solitary or in racemes, terminal; pedicels not articulate; calyx 5-toothed; petals valvate, 5; stamens as many; ovary 5-celled; styles connate into a short column: fr. a 3–5-seeded berry. (Ancient Latin name of the Ivy.) Five species in Eu., N. Afr. and Asia.

A. Pubescence of young growth stellate, grayish.....1. *H. helix*
AA. Pubescence of young growth scaly.
  B. Lvs. usually lobed, to 15 cm. long; scales with 15–20 rays, gray or yellowish.
    C. Lvs. of sterile brs. with 2–5 lobes on each side: fr. yellow.....2. *H. nepalensis*
    CC. Lvs. of sterile brs. usually 3-, rarely 5-lobed: fr. black.....3. *H. japonica*
  BB. Lvs. usually entire, to 25 cm. long, thickly coriaceous; scales yellow, with 20–25 rays: fr. black.....4. *H. colchica*

1. **H. hélix** L. English I. High climbing, to 30 m., or creeping: lvs. of sterile brts. 3–5-lobed, 4–10 cm. long, dark green above, often with whitish veins, pale or yellowish green beneath, those of flowering brts. ovate to rhombic, entire, rounded to truncate at base: umbels globose, usually several forming a raceme; peduncle slender; calyx, pedicels and tips of young brts. with grayish white stellate hairs with usually 5 or 6 rays: fr. black, globose, 6 mm. across. Fl.ix–x; fr.iv–v. R.I.23:t.138b(c). F.D.28:t.2905(c). S.E.4:t.633(c). G.H.t.25(c). M.D.1915.t.31(h);1920:t.15,16(h). Eu. to Caucas. Cult. since ancient times. Zone (V).—Many garden forms and several geographical varieties are known. The following are forms of the typical variety (var. *vulgaris* DC.): Var. **báltica** Rehd. A small-leaved form hardly different from the type, but hardier than other forms.—Var. **arboréscens** Loud. Upright low shrub: lvs. ovate to elliptic, entire. (*H. arborea* Hort.) This form is produced by rooting cuttings from flowering brs.—Var. **argénteovariegàta** West. Lvs. variegated or irregularly edged with white.—Var. **aureovariegàta** West. Lvs. variegated with yellow or wholly yellow. Hibberd, Ivy: frontisp.,p.62,t.f.6(c). (Var. *chrysophylla* Hibb.)—Var. **Cavendíshii** K. Koch. Slow growing, with rather small lvs., dull green, edged creamy white and striped pink or red in autumn.—Var. **marginàta** Hibb. Lvs. broadly triangular-ovate, irregularly edged yellowish white, striped red or pink in autumn. F.E.31:318.—Var. **trícolor** Hibb. Similar to the preceding, but edges of lvs. becoming red in autumn. (Var. *marginata rubra* Hibb., var. *elegantissima* Hort., var. *Cullisii* Hort.)—Var. **digitàta** Loud. Lvs. rather large and broad, digitately lobed with 5 triangular-oblong lobes, sometimes with 2 small additional lobes at the truncate base. Gn.25:141;34:493.—Var. **pedàta** Hibb. Lvs. pedately 5-lobed, the middle lobe long and narrow, the lateral lobes much

shorter, dark green with whitish veins. Gn.25:141;34:493;59:154.—Var. **sagittifòlia** K. Koch. Lvs. rather small, with triangular, pointed middle lobe and broad obtusish lateral lobes, deeply cordate at base, dull dark green.—Var. **deltoìdea** Hibb. Lvs. rather small, bluntly deltoid, almost entire, except 2 deep basal lobes. Gn.25:141;34:493. (Var. *hastata* Hort.)—Var. **mínima** Hibb. Lvs. small, 1.5–3 cm. long, close-set, 3-lobed or pedately 5-lobed with short and spreading basal lobes, dull purplish brown in winter. Gn.59:154. M.G.1897:229(as var. *digitata*). (Var. *donerailensis* Hort.)—Var. **conglomeràta** Nichols. Slow growing; lvs. crowded, small, entire or 3-lobed, undulate. R.H.1890:163.—Var. **tortuòsa** Hibb. Lvs. ovate or rhombic, entire or obscurely 3-lobed, more or less curled and twisted, more so during cold weather. Gn.55:336. Tobler, Hedera:28.

The following are geographical vars.: Var. **hibérnica** Kirchn. Lvs. larger and broader, 6–14 cm. across, of light color and thinner texture, with short and broad lobes, often subcordate at base, dark green; stellate hairs mostly with 8, sometimes 12 rays. (Var. *scotica* Hort., var. *irlandica* Hort., *H. hibernica* Bean.)—Var. **maculàta** Rehd. A form of the preceding with the lvs. spotted and striped yellowish white. (*H. hibernica* var. *m.* Bean, *H. latimaculata* Hort., *H. latifolia maculata* Hort.)

Var. **poëtica** West. Lvs. broad-ovate, shallowly lobed, cordate, often undulate, bright or yellowish green, those of flowering brs. narrower, entire: fr. yellow. Tobler, Hedera:38–42. (Var. *chrysocarpa* Ten., *H. poëtarum* Bertol., *H. chrysocarpa* Walsh.) S. E. Eu., Asia Minor.

Var. **taùrica** Rehd. Lvs. narrow, usually sagittate with elongated middle lobe and 1 or 2 short spreading lobes on each side at base, usually undulate; rather more pubescent, the hairs with about 8 rays. Tobler, Hedera: 43–46. (*H. poetarum* var. *t.* Tobl.) Crimea.

H. h. × *Fatsia japonica* = **Fatshédera Lìzei** Guillaumin. Similar in habit to *F. japonica* and like it probably not hardy within our area. R.H.1912: 568; 1924: 179(h). J.P.IV.24:523. Orig. 1911.

A related species is **H. canariénsis** Willd. High climbing; hairs with 12–20 rays: lvs. roundish-ovate, usually cordate, 5–15 cm. across, entire or with 5–7 short lobes, bright green: fr. larger. Jour.Bot.3:t.32(c). Mo.Bot.Gard.Rep.8:t.27. Tobler, Hedera:49. Gn.25:141;34:492, 496. (*H. Helix* var. *c.* DC., *H. algeriensis*, *H. maderensis* and *H. azorica* Hort.) Canary Isls., Madera, N. Afr. Cult. 1833. Zone VIII?

2. **H. nepalénsis** K. Koch. High climbing; hairs scale-like, with 15–20 rays, gray or yellowish: lvs. of sterile brts. triangular-ovate to triangular-oblong, 5–12 cm. long, pinnately lobed, with 2–5 obtusish teeth or lobes on each side, usually truncate at base, those of fertile brts. oblong-ovate to oblong-lanceolate, broad-cuneate at base, entire; petioles scaly: umbels few to many on rather short stout peduncles: fr. yellow or red. R.H.1884:84,t(c). Tobler, Hedera:69–74. (*H. himalaica* Tobl., *H. cinerea* Bean, *H. Helix* var. *aurantiaca* André, *H. Helix* var. *cinerea* Hibb.) Himal.: Assam to Afghan. and Pundjab. Cult. 1880. Zone VII?—Var. **sinénsis** Rehd. Lvs. of sterile shoots entire or 3-lobed, those of fertile brts. elliptic-ovate to elliptic-lanceolate. Tobler, Hedera:81–83. (*H. himalaica* var. *s.* Tobl.) China.

3. **H. japónica** Tobl. High climbing; hairs scale-like, with 15–20 rays, yellow or yellowish: lvs. of sterile brts. triangular-ovate to broad-ovate, 2–5 cm. long, 3-lobed, rarely 5-lobed, with obtuse lobes, truncate to cordate, those of fertile brts. ovate or rhombic-ovate to oblong-ovate, 5–10 cm. long, rounded to broad-cuneate at base: umbels racemose on slender peduncles; apex of ovary elevated; calyx-limb obsolete: fr. small, black. Tobler, Hedera:

86–88. (*H. Helix* var. *rhombea* Miq., *H. rhombea* Sieb. & Zucc.) Japan, Korea. Cult. 1867? Zone VI?

4. **H. cólchica** K. Koch. High climbing; hairs scale-like, yellow, with 20–25 rays: lvs. broad-ovate to elliptic or on flowering brts. oblong-ovate, 10–25 cm. long, cordate or rounded at base, entire, rarely slightly lobed, dark green, thick and leathery: calyx-lobes triangular-ovate, conspicuous: fr. black. Gt.11:t.360. Tobler, Hedera:58–66. Gn.25:141;34:492;86:448(h). (*H. Helix* var. *c.* K. Koch, *H. Roegneriana* Hort., *H. coriacea* Hibb.) Asia Minor, Cauc. to Persia. Cult. 1860. Zone VII?—Var. **arboréscens** Paul. Of shrubby habit. Gn.W.20:467.—Var. **dentàta** Hibb. Lvs. with remote small teeth, of somewhat thinner texture. G.M.30:388;54:318. (*H. Helix* var. *dentata* Reg.)

2. **ECHINÓPANAX** Decne. & Planch. Deciduous shrubs, prickly throughout; winter-buds with several outer scales: lvs. alternate, long-petioled, palmately 5–7-lobed, exstipulate: fls. greenish white, in umbels forming terminal panicles; pedicels not articulate; calyx-teeth indistinct; petals 5, valvate; stamens 5; styles 2, distinct: fr. a compressed drupe; albumen solid. (Greek *echinos*, hedgehog, and *panax;* referring to the densely spiny nature of the plant.) Syn.: *Oplopanax* Miq. Three species in W. N. Am. and E. Asia.

E. hórridus Decne. & Planch. Shrub to 4 m. with upright stems densely furnished like the petioles and infl. with slender prickles: lvs. orbicular-ovate, 15–25 cm. across, 5–7-lobed, incisely lobulate and sharply serrate, prickly on both sides, glabrous and bright green above, slightly villous beneath: panicle pubescent, 8–15 cm. long: fr. broad-ellipsoid, 8 mm. long, scarlet. Fl.VII–VIII; fr.VIII–IX. B.M.8572(c). Hooker, Fl. Bor. Am.1:t.98. Gs.2:195(h). (*Panax h.* Sm., *Fatsia horrida* Benth. & Hook., *Oplopanax horridum* Miq.—Devil's Club.) Alaska to Calif. Intr. about 1829. Zone V.—Ornamental shrub with large bright green lvs. and conspicuous scarlet fr.

A closely related species is **E. elàtus** Nakai. Lvs. larger, lobes not lobulate or with 1 small lobe on each side of the middle lobe, closely doubly serrate, setose-pilose on the veins and veinlets beneath. J.C.26,1:t.15. Korea. Intr. 1917. Zone V.

3. **ACANTHÓPANAX** Miq. Deciduous, rarely evergreen trees or shrubs, usually sparingly branched and prickly, rarely unarmed; winter-buds ovoid with several outer scales: lvs. alternate, slender-petioled, palmately lobed or digitate, only occasionally entire, exstipulate: fls. perfect or polygamous, in terminal umbels usually few or solitary or forming large terminal panicles; pedicels slightly or not articulate; calyx-teeth minute; petals 5, rarely 4, valvate; stamens as many; ovary 2–5-celled; styles 2–5, connate or free: fr. a 2–5-seeded black berry; albumen solid. (Greek *acanthos*, spine and *panax*; referring to the prickly nature of most of the species.) About 20 species in E. Asia and Himal.—Ornamental shrubs chiefly planted for the ornamental foliage.

A. Lvs. digitate: umbels few or solitary (many in No. 11).
  B. Styles 5, connate into a column. (Sect. ELEUTHEROCOCCUS Harms.)
    C. Brts. glabrous and smooth, with slender usually reflexed prickles; peduncles glabrous, usually slender.
      D. Lfts. glabrous or pubescent, not setose.
        E. Lvs. 5-foliolate, or only partly ternate.
          F. Brts. usually densely furnished with slender, bristle-like prickles, light yellowish brown ..... 1. *A. senticosus*
          FF. Brts. with few usually reflexed prickles, greenish ..... 2. *A. leucorrhizus*
        EE. Lvs. 3-foliolate, rarely a few 4–5-foliolate ..... 3. *A. setchuenensis*
      DD. Lfts. on both sides with bristles or setose hairs, usually 5; brts. yellowish or brownish ..... 4. *A. Simonii*

cc. Brts. rough-pubescent at first, later glabrous and slightly rough, light yellowish gray, with short conical prickles: peduncles stout, pubescent.....5. *A. Henryi*
bb. Styles 2–5, divided at least at apex.
c. Brs. prickly.
d. Fls. subsessile or on short pubescent pedicels 3–10 mm. long: styles 2. (Sect. Cephalopanax Baill.)
e. Lfts. usually 5, rough-pubescent beneath.....6. *A. divaricatus*
ee. Lfts. usually 3, glabrous or nearly so.....7. *A. sessiliflorus*
dd. Fls. slender-pediceled; pedicels glabrous; styles 2–5.
e. Lfts. usually 5: umbels usually solitary; styles usually 5. (Sect. Euacanthopanax Harms.)
f. Umbels at end of elongated leafy brts. on short peduncles: brts. usually with numerous bristly prickles.....8. *A. Giraldii*
ff. Umbels on short lateral spurs, on slender peduncles 4–6 cm. long: brts. with few short stout prickles.....9. *A. Sieboldianus*
ee. Lfts. 3, 2–4 cm. long: umbels 4–7 at end of brts., rarely solitary; styles 2. (Sect. Zanthoxylopanax Harms.).....10. *A. ternatus*
cc. Brs. unarmed: umbels in large terminal panicles; styles 2. (Sect. Sciadophylloides Harms.).....11. *A. sciadophylloides*
aa. Lvs. palmately lobed: umbels in large terminal panicles; styles 2. (Sect. Kalopanax Harms.).....12. *A. ricinifolius*

1. **A. senticòsus** Harms. Shrub to 5 m., with upright sparingly branched stems, usually densely covered with slender bristles or prickles: lfts. 5, sometimes 3, short-stalked, elliptic-obovate to oblong, 6–12 cm. long, short-acuminate, cuneate, sharply and doubly serrate, dark green and with scattered hairs above, light green beneath and brownish pubescent on the veins when young; petiole slender, 6–12 cm. long; umbels globose, many-fld., 3–4 cm. across, 1 or few on slender peduncles 5–7 cm. long; pedicels 1–2 cm. long; fls. purplish yellow: fr. subglobose, 8 mm. across. Fl.vii; fr.x. Gt.12:t.393. S.H.2:f.290a(l). S.L.79(h). M.D.1918:t.1(h). (*Eleutherococcus s.* Maxim.) N. China, Manch. Intr. about 1860. Zone IV.—Var. **inérmis** Komar. Brts. without or few prickles: lvs. and umbels larger.

2. **A. leucorrhìzus** Harms. Shrub to 4 m.; brts. yellowish green, with scattered or below the petiole with several reflexed slender prickles or nearly unarmed: lfts. 3–5, short-stalked, oblong-lanceolate, 5–10 cm. long, acuminate, cuneate, sharply and doubly serrate, glabrous; petiole 3–7 cm. long: umbels several or solitary, 4–5 cm. across, on slender stalks 5–10 cm. long; pedicels 1–2 cm. long, glabrous; fls. greenish: fr. globose-ovoid, 6 mm. long. Fl.vii; fr.x. B.M.8607(c). G.C.III.64:176. B.S.1:130. (*Eleutherococcus l.* Oliv.) C. and W. China. Intr. 1901. Zone V.—Var. **fulvéscens** Harms & Rehd. Lfts. 3–5, scabrous above, fulvous-pubescent on the veins beneath, usually simply serrate. C. and W. China. Intr. 1908.—Var. **scabérulus** Harms & Rehd. Lfts. always 5, smaller and narrower, usually oblong-obovate, doubly serrate, pubescent beneath and setose on the midrib and petiole. C. and W. China. 1907.

3. **A. setchuenénsis** Harms. Upright shrub to 3 m.; brts. yellowish, with few nearly straight prickles: lfts. 3, stalked, oblong-obovate, 5–12 cm. long, long-acuminate, broad-cuneate or nearly rounded at base, remotely serrulate or serrate-dentate to nearly entire, dark green above, glaucescent beneath, glabrous; petiole 4–10 cm. long: umbels 3–7, about 3 cm. across, on peduncles 1–3 cm. long, the middle one sometimes to 10 cm. long; pedicels 6–20 mm. long: fr. black, broad-ellipsoid, 6–8 mm. long, crowned by the short style. Fl.vii; fr.x. M.D.1918:t.2g-k. Gn.85:606. W. China. Intr. 1904. Zone VI or VII?

4. **A. Simòni** Schneid. Shrub to 3 m.; brts. greenish, smooth, with several stout slightly reflexed prickles below the petioles: lfts. 5, short-stalked, oblong to oblanceolate, the middle one 8–12 cm. long, the lateral ones much smaller, acuminate, cuneate, sharply and doubly serrate, bristly on both sides, bright

green; petiole 5–7 cm. long, often with slender prickles: umbels several, on peduncles 1–5 cm. long; pedicels 4–10 mm. long: fr. 6 mm. across. Fl.VII; fr.X. G.C.III.38:404(as *A. leucorhizus*). S.H.2:f.290c(l). M.G.25:25(h). M.D.1913:272;1918:t.1(h). S.L.82(h). (*Eleutherococcus S.* Decne.) C. China. Cult. 1900. Zone V.

5. **A. Hénryi** Harms. Shrub to 3 m.; brts. rough-pubescent when young, becoming light yellowish gray and remaining slightly rough, with stout often slightly recurved prickles: lfts. 5, nearly sessile, obovate to oblong, 3–6 cm. long, narrowed toward the ends, serrulate, scabrid above, pubescent beneath; petiole 4–7 cm. long, scabrous: umbels usually several, on stout pubescent stalks 1–3 cm. long, rarely longer; pedicels 8–15 mm. long, slightly pubescent or glabrous: fr. black, globose-ellipsoid, 8 mm. long, crowned by the slender style. Fl.VIII–IX; fr.X. B.M.8316(c). H.I.1718. G.C.III.38:402. M.D.1913: 272;1918:t.7(h). S.L.80(h). (*Eleutherococcus H.* Oliv.) C. China. Intr. 1901. Zone V.

6. **A. divaricàtus** Seem. Shrub to 3 m., with spreading brs.; brts. glabrous or pubescent, with often paired prickles often recurved at apex: lfts. 5, sessile or short-stalked, oblong-obovate to broad-oblanceolate, 4–12 cm. long, acute or short-acuminate, cuneate, simply or doubly serrate, sparingly pubescent above, villous-pubescent beneath, rarely nearly glabrous; petiole 3–8 cm. long, sometimes prickly: umbels usually 3–7, dense, on rather short pubescent peduncles; pedicels 4–10 mm. long, pubescent: ovary 2-celled; fr. black, subglobose, 6–7 mm. across, crowned by the long slender style slightly 2-lobed at apex. Fl.VIII; fr.IX–X. S.I.2:t.58(c). S.H.2:f.289o-r,290h. Japan. Cult. 1903. Zone V.

A related species is **A. lasiógyne** Harms. Shrub to 6 m.; brts. light gray: lfts. 3, subsessile, obovate to oblong or oblong-obovate, 4–6 cm. long, acute to acuminate, cuneate, entire or sparingly serrate above the middle, glabrous: petiole 1.5–6 cm. long, glabrous: umbels short-stalked; pedicels 5–7 mm. long, pubescent; ovary woolly; styles 2, connate at base. M.D.1918:t.2a-f. W. China. Intr. 1910. Zone VII?

7. **A. sessiliflòrus** Seem. Shrub to 4 m. with spreading brs., with few short prickles or unarmed: lfts. 3, sometimes 5, very short-stalked, oblong-obovate or obovate to oblong-oblanceolate, 6–15 cm. long, acuminate, cuneate, irregularly serrate, nearly glabrous or sometimes scabrid; petiole 3–6 cm. long: fls. dull purplish, nearly sessile in globose dense heads on short pubescent peduncles, usually several at end of brts.: fr. black, broad-ellipsoid, 10–14 mm. long, in a globose head 3–4 cm. across. Fl.VII–VIII; fr.IX–X. Gt.11:t.369. G.C.III.22:339. G.W.8:115,t. (*Panax s.* Rupr. & Maxim.) N. China, Manch., Korea. Intr. about 1860. Zone V.—Var. **pàrviceps** Rehd. Lower: lfts. elliptic, 5–9 cm. long, acute, less distinctly serrate: umbels 1 or few, less than 3 cm. across; fr. ovoid, 1 cm. or less long. N. China. Intr. 1881.

8. **A. Giráldii** Harms. Shrub to 3 m.; brts. densely furnished with bristle-like spreading or reflexed prickles: lfts. 3–5, sessile, obovate to oblong or oblanceolate, 3–7 cm. long, acute or acuminate, cuneate, doubly serrate, glabrous or sparingly setose when young; petiole 3–6 cm. long, glabrous, often bristly: umbels usually solitary, on glabrous peduncles 5–20 mm. long; fls. greenish: fr. subglobose, 8 mm. across, crowned by the short style divided nearly to the middle into 5 spreading lobes. M.D.1918:t.3a-h. Fl.VII–VIII; fr.IX. C. and N. China. Intr. 1912. Zone V.—Var. **inérmis** Harms & Rehd. Brts. unarmed or nearly so, slightly rough. C. China. Intr. 1908.

9. **A. Sieboldiànus** Mak. Spreading shrub to 3 m., with slender arching brs. unarmed or with few compressed prickles: lvs. partly fascicled on short

spurs; lfts. 5–7, subsessile, obovate to oblong-obovate, 2–3.5 cm. long, acute, cuneate, crenate-serrate, glabrous; petiole 3–8 cm. long, glabrous: fls. dioecious, greenish white, in umbels 2–2.5 cm. across, solitary on a slender stalk 5–10 cm. long borne on short lateral spurs; styles 5, connate nearly to the apex: fr. black, subglobose, 6–8 mm. across (not seen in cult. owing to the absence of the staminate plant). Fl.VI–VII. S.H.2:f.289k-n,290d-e. B.C.1: 193(l). (*A. pentaphyllus* March., *A. spinosus* Hort., not Miq., *Aralia pentaphylla* Sieb. & Zucc., not Thunb., *Eleutherococcus japonicus* Nakai.) Japan. Cult. 1859. Zone V.—Var. **variegàtus** Rehd. Lvs. edged white. F.S.20:t. 2079(c). (*Aralia pentaphylla varie gata* Nichols.)

A related species is **A. spinòsus** Miq. Lfts. often sparingly appressed-setose above, thinner; peduncles shorter than petioles; styles 2, nearly distinct. S.H.2: f.290f-g. Japan. Intr. ?

10. **A. ternàtus** Rehd. Shrub to 2 m.; brs. gray or grayish brown, with few stout spines usually in pairs below the petiole or unarmed: lfts. 3, subsessile, elliptic-ovate or rhombic-elliptic, 2–4 cm. long, short-acuminate to acutish, cuneate, lustrous on both sides, glabrous, thickish; petiole 1–2.5, rarely to 4 cm. long: umbels usually 4–7, rarely solitary, on peduncles 1–1.5 cm. long; style 2, distinct: fr. subglobose, compressed, 6–7 mm. across, black-purple. Fl.x; fr.x–xi. S. W. China. Cult. 1910. Zone V.

The related **A. trifoliatus** Voss (*A. aculeatus* Seem.) is probably not hardy within our area.

11. **A. sciadophylloìdes** Franch. & Sav. Shrub or tree to 12 m.; brts. glabrous, slender, unarmed: lfts. 5, rarely 3 or 4, stalked, obovate or elliptic to oblong, 10–22 cm. long, short-acuminate, cuneate to rounded at base, crenate-serrate and ciliate, glabrous or with axillary tufts of hairs beneath; petiole 7–25 cm. long: umbels in large and loose glabrous panicles; pedicels 4–10 mm. long: fr. subglobose, bluish black. Fl.VIII–IX; fr.x–xi. S.I.2:t. 55(c). M.D.1918:t.4g-l. S.H.2:f.289s-u,291e. (*Kalopanax s.* Harms.) Japan. Intr. 1905. Zone VI or VII?

Another species with unarmed brs. but belonging to the sect. Evodiopanax Harms is **A. innovans** Seem. Small tree: lvs. crowded at end of brts., slender-petioled, 3-foliolate or partly undivided and cordate at base: lfts. subsessile, rhombic-ovate or ovate to oblong, 4–7 cm. long, acuminate, minutely crenate-serrulate or nearly entire, ciliate, glabrous or nearly so: umbels racemose on slender peduncles, glabrous: fls. 4-merous; styles 2, connate only at base. S.I.2:t.56(c). M.D.1918:t. 4d-f. (*Evodiopanax i.* Nakai.) Japan. Intr. 1894. Zone VI or VII.

12. **A. ricinifòlius** Seem. Sparingly branched tree to 30 m.; brs. with numerous stout prickles; lvs. suborbicular, 9–25, sometimes to 35 cm. across, 5–7-lobed with triangular-ovate to oblong-ovate acuminate serrate lobes, dark green above and glabrous or nearly so, light green beneath and usually slightly pubescent when young: petiole 8–50 cm. long: umbels forming a large compound terminal inflorescence 20–30 cm. across; pedicels 5–10 mm. long; fls. white; stamens longer than petals: fr. subglobose, 4 mm. across, bluish black, crowned by the slender style. Fl.VII–VIII; fr.IX–X. S.I.2:t.56(c). M.D.1913:145;1918:t.5,6&8a(h). G.W.11:537. B.C.1:192. (*Kalopanax r.* Miq.) China, Manch., Korea, Japan. Intr. about 1865. Zone IV.—Var. **magnìficus** Zabel. Brts. nearly unarmed or with few prickles: lvs. with short lobes. (*A. acerifolius* Schelle.) M.D.1918:t.8b(h).—Var. **Maximowíczii** Schneid. Lvs. deeply 5–7-lobed with oblong lanceolate lobes reaching more than ½ toward the centre, pubescent beneath. F.S.20:t.2067(h,c). M.G.12:233(h);34:164(h). M.D.1915:t.8(h);1918:t.5e,7&8(h). (*Aralia M.* Vanhoutte.) Japan. Cult. 1874.—Ornamental tree of striking subtropical effect.

4. **ARÀLIA** L. Herbs or deciduous shrubs or trees: brts. with large pith armed with stout prickles; winter-buds with few outer scales: lvs. alternate, petioled, pinnate to thrice pinnate, estipulate: fls. in umbels forming usually large terminal panicles; pedicels articulate; calyx-lobes minute; petals imbricate; stamens 5; ovary 5-, rarely 2-celled; styles free or connate only at base: fr. a small berry-like drupe, with 2–5 compressed stones. (Name of uncertain derivation.) About 20 species in N. Am., Asia, Malaya and Australia.

A. Prickles stout: tall shrubs or trees, with large much compound infl.
B. Veins of lfts. curving before reaching the margin; lfts. distinctly stalked. . 1. *A. spinosa*
BB. Veins straight, ending in the teeth; lfts. subsessile or short-stalked.
C. Infl. with elongated main axis: lfts. rather closely serrate. . . . . 2. *A. chinensis*
CC. Infl. with short main axis and subumbellate spreading secondary axes: lfts. rather coarsely or remotely serrate. . . . . 3. *A. elata*
AA. Prickles slender, bristly: low suffruticose plants: infl. with few or several umbels. 4. *A. hispida*

1. **A. spinòsa** L. Hercules' Club. Tree to 15 m. with very prickly stems: lvs. 40–80 cm. long, bipinnate, usually prickly above; lfts. ovate, 5–8 cm. long, acuminate, serrate with small usually accumbent teeth, glaucous and nearly glabrous beneath; petiole to 25 cm. long: fls. small, whitish, in large pubescent panicles 20–35 cm. long, with elongated main axis, 1–3 at end of the brs.; pedicels 3–10 mm. long: fr. globose, about 6 mm. across, black. Fl.VIII; fr.IX–X. S.S.5:t.211. Gn.50:126;75:19(h). (Angelica-tree, Devil's Walking-stick.) S. Pa. and s. Ind. and e. Iowa to Fla. and e. Tex. Intr. 1688. Zone V.

2. **A. chinénsis** L. Chinese Angelica-tree. Shrub or rarely tree to 8 m., similar to the preceding, less prickly: lvs. 40–80, bipinnate, unarmed or with few prickles: lfts. ovate or broad-ovate, 5–10 cm. long, rather closely serrate with small, often accumbent teeth, pubescent and paler beneath, the veins dividing before reaching the margin and ending in the teeth: fls. in an elongated usually solitary pubescent panicle 25–40 cm. long; umbels on axes of the 2d to 4th order: fr. about 3 mm. across. China. Intr.?—Var. **nùda** Nakai. Lfts. glaucescent and glabrous beneath except sparingly pubescent along midrib: panicle puberulous; main axis glabrescent. Intr. 1919. Zone (V)?

3. **A. elàta** Seem. Japanese Angelica-tree. Shrub or tree to 15 m.; stems usually prickly: lvs. 40–80 cm., sometimes over 1 m. long, bipinnate; lfts. ovate or elliptic-ovate to narrow-ovate, 6–12 cm. long, acuminate, serrate with rather broad teeth or remotely serrulate, dark green above, glaucescent beneath and slightly pubescent on the veins when young: fls. in a broad corymbose infl. consisting of a short main axis with several subumbellate spreading brs. 30–45 cm. long, pubescent; umbels on axes of the 3d to 5th order. Fl.VIII; fr.IX–X. S.I.2:t.55(c). B.S.1:198. G.C.III.78:269. G.W.5:509(h). B.C.1:344(h). (*A. chinensis* var. *mandshurica* Rehd., *A. chinensis* var. *canescens* Koehne, not Franch. & Sav., *Dimorphanthus elatus* Miq., *D. mandshuricus* Maxim., *A. japonica* Hort.) Manch., Korea, Japan and Saghalin. Intr. 1830. Zone IV.—Var. **variegàta** Nakai. Lfts. irregularly bordered with white. G.C.III.31:231;60:245(h). (*A. chinensis* var. *albo-marginata* Bean.)—Var. **aureo-variegàta** Nakai. Lfts. variegated or irregularly margined with yellow. (*Dimorphanthus mandshuricus elegantissimus fol. var.* Hort.)—Var. **fastigiàta** Rehd. Of fastigiate habit with erect brs.: lvs. shorter, less spreading; lfts. smaller, pubescent on the veins beneath when young. Cult. 1917.—Var. **canéscens** Nakai. Lfts. densely grayish or yellowish pubescent beneath. (*A. spinosa* var. *c.* Franch. & Sav.) Japan. Tenderer.—Like *A. spinosa* a very effective tree with large bold lvs. and conspicuous ample clusters of white fls. in late summer.

4. **A. hispida** Vent. Bristly Sarsaparilla. Subshrub to 1 m.; stems woody up to 25 cm.; root-stock creeping: lvs. bipinnate; lfts. ovate or elliptic to oblong, 2–7 cm. long, acute, rounded or broad-cuneate at base, sharply and irregularly serrate, glabrous or pubescent on the veins beneath: umbels on slender peduncles, 3 or more in a terminal loose corymb; fls. white: fr. subglobose, 6–8 mm. across, purple-black. Fl.vi–vii: fr.viii–ix. B.M.1085(c). L.B.1306(c). Nfd. to N. C., w. to Minn. and Ind. Intr. 1788. Zone III or I?

A related species, but less woody is **A. nudicaùlis** L. Root-stock creeping; the upright woody stem rarely 10 cm. long: usually with 1 or few lvs. 20–30 cm. high, with three 3–5-foliolate divisions; lfts. elliptic to ovate, 5–12 cm. long, acuminate, serrulate: umbels 2 or 3. Fl.v–vi. B.B.2:506. Nfd. to N. C., w. Man. and Mo. Intr. 1731. Zone I?

Fam. 84. UMBELLIFERAE Juss. PARSLEY FAMILY.

Herbs, rarely shrubs, containing a volatile oil or balsam; stem usually hollow: lvs. alternate, usually pinnately or ternately compound, rarely simple, exstipulate: fls. small, perfect, regular or the outer fls. irregular, epigynous, in simple or compound umbels; calyx-limb minute; petals 5, valvate; stamens 5, inserted at the margin of the epigynous disk; ovary inferior, 2-celled; cells 1-ovuled; styles 2: fr. consisting of 2 dry winged or ribbed achenes with oil-ducts, separating from each other at maturity but remaining attached at the top to a slender Y-shaped carpophore; seed albuminous; embryo straight. Syn.: *Ammiaceae* Presl.—About 230 genera and 1500 species in boreal, temp. and subtrop. regions.

BUPLEÙRUM L. Herbs or shrubs: lvs. simple, entire, often perfoliate: fls. yellow or yellowish green, in compound umbels; calyx-limb without teeth; petals suborbicular, entire and strongly involute; stylopodium depressed: fr. oblong, compressed; achenes with 5 slender, wing-like ribs. (Ancient Greek name of an umbelliferous plant.) About 75 species in Eu., Asia and Afr., 1 in N. Am.

B. fruticòsum L. Evergreen or half-evergreen upright glabrous shrub to 2.5 m., with slender brs. purplish when young: lvs. subsessile, narrow-elliptic to oblong-obovate, 5–8 cm. long, mucronate, cuneate, entire, bluish green, leathery: fls. yellow, small in terminal slender-stalked umbels 7–10 cm. across, with a reflexed involucre at base, the umbellets also with reflexed involucres. Fl.vii–viii. E.N.III.8:180. S.F.t.263(c). B.C.1:600. S. Eu. Intr. about 1600. Zone VII or VIII.—Of little ornamental value, but interesting as the only shrubby representative of Umbelliferae hardy within our area.

Fam. 85. CORNACEAE Lk. DOGWOOD FAMILY.

Trees or shrubs, rarely herbs: lvs. opposite, or alternate, entire, rarely toothed or lobed, exstipulate, rarely stipulate: fls. perfect, rarely unisexual, regular, epigynous; sepals 4, rarely 5, minute or wanting; petals 4, rarely 5, usually valvate; stamens as many, inserted on the margin of the usually present epigynous disk; ovary inferior, usually 2-celled, rarely 3–5-celled; ovules solitary, pendulous; style short: fr. a drupe or berry; seeds albuminous, with straight usually small embryo.—Ten genera with about 90 species in the temp. and subtrop. regions of the n. hemisphere, few in the s. hemisphere.

A. Fls. borne on the upper surface of the lvs.: lvs. alternate, deciduous.....1. *Helwingia*
AA. Fls. axillary or in a terminal infl.: lvs. usually opposite.
B. Fls. 1–4, axillary: lvs. 1–2 cm. long, alternate, evergreen.....2. *Corokia*
BB. Fls. in a many-fld. usually terminal infl.: lvs. 3–15 cm. long, opposite, rarely alternate.
C. Lvs. evergreen; fls. polygamous, in terminal panicles.....3. *Aukuba*
CC. Lvs. deciduous: fls. perfect, in corymbs or umbels.....4. *Cornus*

1. **HELWÍNGIA** Willd. Deciduous shrubs; winter-buds small, with few outer scales: lvs. alternate, petioled, serrate; petiole sometimes with stipular appendages: fls. dioecious, small, 3–5-merous, usually 4-merous, in fascicles on the upper surface of the lvs.; calyx-limb obsolete; petals triangular-ovate, valvate; staminate fls. with or without rudimentary styles in the middle of the large disk; pistillate fls. without stamens or staminodes, with a short style with 3–5 thick subulate stigmas; ovary 3–5-celled: fr. a berry-like drupe with 1–4 stones. (After G. A. Helwing, a German clergyman and botanical author; 1666–1748.) Three species in E. Asia and Himal.

H. japónica F. G. Dietr. Bushy shrub to 1.5 m. with slender green glabrous brts.: lvs. ovate, 3–7 cm. long, acuminate, broad-cuneate, serrulate with bristle-like teeth from near the base, glabrous and bright green on both sides; petiole 1–2.5 cm. long, sometimes with subulate branched small stipules: fls. greenish white, staminate 10–20, short-stalked; pistillate 1–3, subsessile: fr. subglobose, 6 mm. across, black. Fl.VI; fr.VIII. S.I.2:t.58(c). S.Z.1:t. 68(c). E.N.III.8:263. E.P.IV.229:35. A.G.13:8. S.L.223(h). (*H. rusciflora* Willd.) China, Japan. Intr. about 1830. Zone (V), VI.—Of little ornamental value, but interesting on account of the position of the fls.

H. chinénsis Batal. Shrub to 2 m.: lvs. ovate-lanceolate to linear-lanceolate, to 12 cm. long, acute, cuneate, with short suberect teeth, entire toward the base: staminate fls. on pedicels 7–25 mm. long. E.P.IV.229:36. W. China. Intr. 1910? Zone VII?

2. **CORÓKIA** A. Cunn. Evergreen shrubs or small trees with rigid often tortuous brs. silky-pubescent when young: lvs. alternate, petioled, small, entire: fls. perfect, small, 4–5-merous, in axillary and terminal clusters; sepals triangular; petals each with a scale at base; ovary 1–3-celled; style with 1–3 stigmas: fr. a drupe crowned by the persistent calyx. (Name derived from the native name of the shrub.) Three or 4 species in New Zealand.

C. Cotoneáster Raoul. Sparsely leaved shrub to 3 m., with tortuous brs. white-tomentose when young: lvs. orbicular-ovate to oblong-ovate, 1–2 cm. long, obtuse or emarginate, cuneate, lustrous above, white-tomentose beneath: fls. 1–4, axillary, short-stalked, about 1 cm. across, yellow, silky-pubescent outside; petals linear: fr. ellipsoid, 6–8 mm. long, red. Fl.V–VI. B.M.8425(c). I.T.2:t.73. B.S.1:394. Gn.89:554(h). S.L.162(h). New Zeal. Intr. about 1875. Zone VIII?

3. **AUKÙBA** Thunb. Evergreen shrubs with stout terete forked brs.: lvs. opposite, petioled, serrate or entire: fls. dioecious, small, purplish, in terminal panicles; pedicels short, with 2 bractlets; calyx minute, 4-toothed; petals 4, ovate to lanceolate, valvate; staminate fls. with 4 stamens and a large 4-angled central disk, without rudimentary ovary; filaments short; pistillate fls. with an inferior, 1-celled and 1-ovuled ovary; style short, thick, with an oblique capitate stigma, without stamens: fr. a 1-seeded berrylike drupe; seed albuminous with the minute embryo at the top. (Name latinized from the Japanese Aokiba.) Three species in E. Asia and Himal.

A. japónica Thunb. JAPANESE AUKUBA. Stout shrub to 5 m.: brts. thick, glabrous, green: lvs. elliptic-ovate to elliptic-lanceolate, 8–20 cm. long, acute to acuminate, with an obtusish apex, broad-cuneate at base, remotely coarsely dentate, lustrous green on both sides; petiole 1–5 cm. long: fls. about 8 mm. across; petals short-acuminate; the staminate fls. in panicles about 5–10 cm. long, rather densely strigillose; the pistillate infl. shorter, rather sparingly strigillose or nearly glabrous: fr. short-ellipsoid, 1.2–1.5 cm. long, scarlet, in dense panicles 5–8 cm. long. Fl.III–IV; fr.XI(–III). B.M.5512(c). S.I.2:t.

59(c). Gt.25:t.859(c). I.H.11:t.399(c). E.P.IV.229:39. Am. For. 28:103(h). Japan. Intr. first in 1783 in its variegated form and in 1861 in its normal green form also distinguished as var. **cóncolor** Reg. (Var. *viridis* Hort.). Zone VII.—The best known form is var. **variegàta** Dombr. (not Reg.). GOLDDUST-TREE. Lvs. with numerous small yellow spots. B.M.1197(c). F.M.5:t.277(c). R.H.1866:t.292(c). Gs.2:280(h). (Var. *maculata* Reg., var. *punctata* Hort.)—Var. **latimaculàta** Kirchn. Lvs. ovate-oblong with a large irregular blotch in the middle and smaller yellow dots around it. F.M.10:t. 527(c). F.W.1876:353. (Var. *picta* Bull, var. *aureo-maculata* Dombr.)—Var. **limbàta** Bull. Lvs. large coarsely dentate, with a greenish yellow margin.—Var. **dentàta** Carr. Lvs. smaller, elliptic, with few coarse teeth on each side near apex.—Var. **longifòlia** Veitch. Lvs. narrow-oblong-lanceolate, 8–12 cm. long, green. (Var. *angustifolia* Reg., var. *salicifolia* Hort.)

Related species are: **A. himaláica** Hook. f. & Thoms. Lvs. ovate-lanceolate to lanceolate, 10–25 cm. long, long and sharply acuminate, serrate to entire: infl. densely fulvous-pubescent; petals long-acuminate; F.S.12:t.1271(c). I.H.6:t.197 (c). (*A. japonica* var. *h.* Dipp.) E. Himal. Cult. 1857. Zone VIII?— **A. chinénsis** Benth. Lvs. lanceolate to obovate, 8–20 cm. long, sharply long-acuminate, entire or dentate toward the apex: infl. sparingly strigillose; petals long-acuminate. China. Intr 1901. Zone VIII?

4. **CORNUS** L. DOGWOOD. Deciduous, rarely evergreen trees or shrubs, rarely herbs; winter-buds elongated, with 2 valvate scales; the axillary ones appressed: lvs. opposite, rarely alternate, petioled, entire, usually pubescent with 2-armed appressed hairs: fls. perfect, small, 4-merous, in terminal cymes or heads often surrounded by involucral bracts; calyx with minute teeth; petals ovate to oblong, valvate; style simple, filiform or cylindric; ovary inferior, 2-celled: fr. a drupe with a 2-celled stone. (The ancient Latin name of *C. mas.*) About 40 species in temp. regions of the n. hemisphere; all woody except 2 species.—Ornamental shrubs grown chiefly for their handsome fls. and some for their showy frs. and also for the winter effect of the brightly colored brs.

A. Fls. in cymes or panicles without an involucre; stone subglobose. (Sect. THELYCRANIA Endl.)
  B. Lvs. alternate.
    C. Lvs. with 5–6 pairs of veins, usually cuneate at base ..... 1. *C. alternifolia*
    CC. Lvs. with 6–9 pairs of veins, usually rounded at base ..... 2. *C. controversa*
  BB. Lvs. opposite.
    C. Fr. white or blue.
      D. Lvs., brts. and infl. with appressed hairs or glabrescent.
        E. Lvs. whitish beneath: fr. white or bluish white.
          F. Mature brts. bright red, or sometimes green or yellow, smooth, rather stout; pith white: cymes flat: stone compressed.
            G. Stone ellipsoid, narrowed at ends: lvs. acute ..... 3. *C. alba*
            GG. Stone about as broad as high; rounded at base: lvs. acuminate. 4. *C. stolonifera*
          FF. Mature brts. gray, thin; pith brown: cyme convex, paniculate; stone subglobose, not compressed ..... 12. *C. racemosa*
        EE. Lvs. green or only slightly paler beneath: pith white.
          F. Fr. pale blue; anthers blue; cyme convex: lvs. acuminate ..... 11. *C. femina*
          FF. Fr. white; cyme flat: lvs. usually obtusely short acuminate or acutish. 10. *C. glabrata*
      DD. Lvs. with more or less spreading hairs beneath at least on the veins or at least brts. and infl. villous.
        E. Fr. white.
          F. Lvs. smooth above: brts. red-brown or red, smooth rather stout: pith white, ample ..... 5. *C. Baileyi*
          FF. Lvs. scabrid above: brts. brownish, slightly rough, thin: pith narrow, brown. 9. *C. asperifolia*
        EE. Fr. blue.
          F. Mature brts. greenish, spotted; pith white: lvs. woolly beneath: fr. pale blue. 6. *C. rugosa*
          FF. Mature brts. red or purple; pith brown: lvs. pubescent only on the veins: fr. usually dark blue, sometimes partly whitish.

g. Lvs. green beneath, rusty-pubescent on the veins.....7. *C. Amomum*
gg. Lvs. whitish beneath, grayish or whitish pubescent on the veins. 8. *C. obliqua*
cc. Fr. black or bluish black (green in a var. of No. 18).
d. Fls. in broad panicles: lvs. with 6–8 pairs of veins, appressed-pilose. 13. *C. macrophylla*
dd. Fls. in flat cymes.
e. Lvs. with appressed hairs beneath or nearly glabrous: style clavate, thickened at apex.
f. Sepals longer than disk.
g. Lvs. oblong-obovate to elliptic-lanceolate, with 2–3 pairs of veins. 14. *C. paucinervis*
gg. Lvs. usually broader, with 4–6 pairs of veins.....15. *C. pumila*
ff. Sepals minute, scarcely as long as disk.
g. Lvs. long-acuminate: mature brts. greenish or dull red.....16. *C. Walteri*
gg. Lvs. abruptly acuminate; mature brts. purple.....17. *C. coreana*
ee. Lvs. woolly-pubescent beneath: calyx-teeth shorter than disk.
f. Mature brts. purple or blood-red (green in a var.): style thickened at apex. 18. *C. sanguinea*
ff. Brts. greenish or reddish; style cylindric.....19. *C. Bretschneideri*
aa. Fls. in dense umbels with an involucre: stone ellipsoid to oblong.
b. Fls. yellow with a yellowish involucre not exceeding the fls. and deciduous during anthesis. (Sect. Macrocarpium Spach.)
c. Lvs. without conspicuous tufts of hairs in the axils beneath; pedicels not or slightly exceeding the involucre.....20. *C. mas*
cc. Lvs. with conspicuous brown axillary tufts of hairs beneath: pedicels nearly twice as long as bracts.....21. *C. officinalis*
bb. Fls. greenish yellow with large white or pink bracts.
c. Frs. in dense clusters, but individually distinct. (Sect. Benthamidia K. Koch.)
d. Involucral bracts 4, emarginate.....22. *C. florida*
dd. Involucral bracts 4–6, acuminate to obtuse.....23. *C. Nuttallii*
cc. Frs. connate into a globose fleshy head. (Sect. Benthamia Benth. & Hook.) 24. *C. kousa*

1. **C. alternifòlia** L. Shrub or small tree to 8 m., with the brs. spreading in irregular whorls forming horizontal tiers: brts. glabrous, greenish: lvs. alternate, slender-stalked, usually crowded at end of brts., elliptic-ovate, 6–12 cm. long, acuminate, cuneate, nearly glabrous above, glaucescent beneath and appressed-pubescent; petiole 2–5 cm. long: cymes 4–6 cm. across, puberulous, slender-stalked: fr. 6–8 mm. across, bluish black, bloomy, on red pedicels. Fl.v–vi; fr.viii. Em.463(c). G.O.t.43(c). S.O.2:t.70(c). S.S.5:t. 216. B.C.2:852(h). (*Svida a.* Small.) N. B. to Minn., s. to Ga. and Ala. Intr. 1760. Zone IV.—Var. **argéntea** Temple & Beard. Lvs. variegated with white. (Var. *variegata* Hort.)

2. **C. controvérsa** Hemsl. Tree to 20 m., similar to the preceding: lvs. broad-ovate to elliptic-ovate, 7–12 cm. long, abruptly acuminate, usually rounded at base, glaucous beneath and slightly appressed-pubescent: cymes 6–12 cm. across: fr. bluish black, 6 mm. across. Fl.v; fr.viii–ix. B.M.8464(c). S.I.1:t.77,f.13–23(c). Gn.79:386(h);88:537(h). J.L.27:861(h);40:f.7(h). (*C. brachypoda* K. Koch, not C. A. Mey., *C. macrophylla* Kochne, not Wall.) Japan, China. Intr. before 1880. Zone V.—Var. **variegàta** Rehd. Lvs. edged white. Gng.3:67;16:291. J.H.III.28:129;47:147.

3. **C. alba** L. Shrub to 3 m. with usually erect stems and blood-red brs.; usually bloomy when young; pith ample, white: lvs. ovate to elliptic, 4–8 cm. long, acute, usually rounded at base, rugose and often somewhat bullate above and dark green, glaucous beneath, with about 6 pairs of veins; petiole 1–2.5 cm. long: fls. yellowish white, in cymes 3.5–5 cm. across: fr. white or slightly bluish; stone higher than broad, acute at ends, flattened. Fl.v–vi; fr.viii–ix. S.O.2:t.65(c). S.H.2:f.294p-r,295m-o. (*C. tatarica* Mill.) Siberia to Manch. and n. Korea. Intr. 1741. Zone I.—Var. **argenteo-marginàta** Rehd. Lvs. edged with creamy-white. R.H.1906:421. J.L.40:f.7(h). (*C. alba elegantissima variegata* Hort., *C. alba variegata* Bean.)—Var. **Gouchaùltii** Rehd. Lvs. variegated with yellowish white and pink.—Var. **Spaèthii** Wittm. Lvs. broadly edged with yellow. Spaeth, Cat. 1889–90,t(c). Gn.64:368(h);

88:127(h).—Var. **sibírica** Loud. Less vigorous; brts. bright coral-red. C.L.A. 21,No.4:29. G.M.54:249. (*C. s.* Lodd.)—Var. **Kesselríngii** Rehd. Brts. very dark purple, almost purplish black; young unfolding lvs. red. (*C. sibirica* var. *K.* E.Wolf.) Cult. 1906.

4. **C. stolonífera** Michx. Red-Osier Dogwood. Shrub to 2.5 m. with prostrate stems and stoloniferous; brts. dark blood-red; pith white, large: lvs. ovate to oblong-lanceolate, 6–12 cm. long, acuminate, rounded at base, dark green above, glaucous beneath, with about 5 pairs of veins; petiole 1–2.5 cm. long: fls. dull white, in cymes 3–5 cm. across; disk usually red: fr. white, globose, 5 mm. across; stone as broad as high or slightly broader, rounded at base. Fl.v–vi; fr.ix–x. B.B.2:662. G.C.II.8:679. B.C.2:852(h). (*C. alba* Wangh., not L.) Nfdl. to Man., s. to Va., Ky. and Neb. Cult. 1800. Zone I. —Var. **flaviràmea** Rehd. Brts. yellow. (*C. alba f.* Spaeth.) Cult. 1899.—Var. **nítida** Schneid. Brts. green in winter: lvs. lustrous above, with 6–8 pairs of veins. (*C. alba* var. *n.* Koehne.)—Var. **coloradénsis** Schneid. Brts. brownish red: lvs. smaller, less pale beneath: fr. bluish white; stone higher than broad. (*C. alba* var. *c.* Koehne, *C. instolonea* Nels., *C. stolonifera* var. *riparia* Rydb.) Yukon and Man. to N. Mex. and Calif.

5. **C. Baileyi** Coult. & Evans. Upright shrub to 3 m.; brts. dark red in winter, short-villous when young; pith white, large: lvs. ovate to lanceolate, 5–12 cm. long, acute or acuminate, rounded at base, glaucous beneath and with woolly and appressed hairs: cymes 3–5 cm. across, dense, villous: fr. white, 8 mm. across, much broader than high, compressed. Fl.v–vi; fr.vii–viii. G.F.3:465. B.C.2:853. B.B.2:662. S.H.2:295v-x². (*C. alba* subsp. *B.* Wanger.) Ont. and Minn. to Pa. and Ind. Intr. 1892. Zone V or IV.

Related species are: **C. intérior** Petersen. Lvs. elliptic, 5–9 cm. long, acute at ends, appressed-pubescent beneath and villous only on and near the veins: infl. short-villous: stone longer than broad. (*Svida i.* Rydb.) N. Dak. and Alaska to Kans. and Colo. Intr. ?—**C. pubéscens** Nutt. Shrub to 6 m., sometimes nearly tree-like; brts. purple: lvs. elliptic to ovate, 4–10 cm. long, acute to obtusish, slightly pubescent above, glaucous and woolly beneath: fls. yellowish white, in dense cymes 5 cm. across: fr. white; stone much broader than high. (*C. californica* var. *p.* Macbr., *C. Torreyi* S. Wats., *Svida p.* Standl.) S.H.2:f.294s(l). B. C. to Calif. Intr. 1874. Zone VI?

6. **C. rugòsa** Lam. Upright shrub to 3 m., sometimes tree-like; young brts. green, spotted purple, older purplish sometimes yellowish; pith white: lvs. suborbicular to broad-ovate, 5–12 cm. long, acute or short-acuminate, slightly pubescent above, pale and densely villous beneath, with 6–8 pairs of veins; petiole 1–1.5 cm. long: cymes dense, 5–7 cm. across, slightly villous or nearly glabrous: fr. light blue or greenish white, 5–6 mm. across; stone subglobose. Fl.v–vi; fr.ix. S.O.2:t.69(c). Em.464(c). E.P.IV.229:61. B.B.2:661. (*C. circinnata* L'Hérit.) N. S. to Man., s. to Va., Ill. and Iowa. Intr. 1784. Zone II.

C. r. × *stolonifera* = **C. Slavínii** Rehd. Brts. purple: lvs. intermediate in shape, more or less woolly beneath: fr. bluish, rarely white. Orig. before 1910.

7. **C. Amòmum** Mill. Shrub to 3 m. with spreading brs.: brts. purple; pith brown: lvs. elliptic-ovate or elliptic, 5–10 cm. long, short-acuminate, usually rounded at base, dark green and nearly glabrous above, lighter green or slightly paler beneath and with brown hairs on the veins; petiole 8–15 mm. long: fls. yellowish white in flat dense cymes 4–6 cm. across, usually slightly villous: fr. blue or sometimes partly white, 6 mm. across; stone subglobose, furrowed. Fl.vi; fr.ix. S.O.2:t.64(c). Em.466,t(c). B.B.2:661. (*C. sericea* L., *C. coerulea* Lam., *Svida A.* Small.) Mass. to Ga., w. to N. Y. and Tenn. Intr. 1683. Zone V.

C. A. × *macrophylla* = *C. Horseyi;* see under No. 13.—*C. A.* × *paucinervis* = *C. dubia;* see under No. 14.

8. **C. oblìqua** Raf. Shrub similar to the preceding, but usually more loosely branched: brts. purple to yellowish red: lvs. elliptic-ovate to oblong, 5–8 cm. long, acuminate, cuneate, dark green and glabrous above, glaucous beneath and with grayish white or brownish hairs on the veins: cymes 4–5 cm. across, slightly villous: fr. blue or partly or sometimes nearly white; stone furrowed. Fl.vi; fr.ix. R.H.1888:444,t(c, as *C. stolonifera*). S.T.1:t.39. (*C. Purpusii* Koehne.) Que. to Minn., and Kans., s. Pa., Ill. and Mo. Intr. probably long before 1888. Zone IV or III?

C. o. × *racemosa* = **C. arnoldiàna** Rehd. Of more upright habit; brts. slenderer, grayish the second year; cymes less villous: fr. white or light blue; stone less furrowed. S.T.2:t.40. Orig. before 1900.

9. **C. asperifòlia** Michx. Upright shrub to 5 m., or sometimes small tree to 15 m. with slender spreading brs.; pith brown, narrow; brts. reddish brown, slightly rough, pubescent when young: lvs. elliptic to ovate, 4–10 cm. long, acuminate, rounded or cuneate at base, scabrid above, rarely nearly smooth, woolly pubescent beneath; petiole 5–15 mm. long: fls. yellowish white, in rather loose pubescent corymbs 4–7 cm. across: fr. white, 6 mm. across; stone subglobose, slightly furrowed. Fl.v–vi; fr.ix. G.F.10:105. S.S.14:t.709. B.B.2: 662. (*C. candidissima* Bischoff, not Mill., nor Marsh.) Ont. to Fla., w. to Iowa, Kans. and Tex. Cult. 1836. Zone IV?

C. a. × *macrophylla* = *C. Dunbarii;* see under No. 13.

10. **C. glabràta** Benth. Shrub to 4 m., with slender brs., soon glabrous, reddish brown, becoming dark gray-brown; pith white: lvs. narrow-elliptic, 3–8 cm. long, acuminate, cuneate, lustrous and green on both sides and sparingly appressed-pubescent, with 3–4 pairs of veins; petiole 5–10 mm. long: cymes 2.5–3 cm. across, nearly glabrous: fr. white or light blue, 5–6 mm. across; stone subglobose, not ribbed: Fl.v; fr.ix–x. S.H.2:f.296g-h(l). Ore. to Calif. Intr. 1894. Zone VI?

11. **C. fémina** Mill. Shrub to 5 m., with purple-brown brs.; pith white: lvs. elliptic or ovate to ovate-lanceolate, 3–7 cm. long, acuminate, cuneate, sparingly and minutely appressed-pubescent and green on both sides or slightly paler beneath; petiole 5–10 mm. long: cymes 3–6 cm. broad; anthers light blue: drupe subglobose, 5–6 mm. across, pale blue; stone usually longer than broad, faintly ribbed. Fl.v–vi; fr.ix. S.O.2:t.67(c). B.B.2:663,f.3187. L'Héritier, Cornus,t.4. (*C. stricta* Lam., *Svida s.* Small.) Va. to Mo., Fla. and Tex. Intr. 1758. Zone VI?

12. **C. racemòsa** Lam. Shrub to 5 m., with gray brts.; pith brown: lvs. narrow-elliptic to ovate-lanceolate, 4–10 cm. long, long-acuminate, cuneate, appressed-pubescent or nearly smooth, glaucous beneath; petiole 8–15 mm. long: cymes 3–6 cm. broad, paniculate, rather loose; petals oblong, obtusish: fr. white, 4–5 mm. across, on red pedicels: stone broader than high, slightly ribbed. Fl.vi–vii; fr.ix–x. S.O.2:t.68(c). B.B.2:663,f.3186. Gs.3:270. (*C. paniculata* L'Hérit., ?*C. candisissima* Marsh., *C. oblongata* Hort.) Me. to Ont. and Minn., s. to Ga. and Neb. Intr. 1758. Zone IV.

C. r. × *obliqua* = *C. arnoldiana;* see under No. 8.

13. **C. macrophýlla** Wall. Tree to 15 m.; brts. yellowish or reddish brown: lvs. elliptic-ovate to elliptic-oblong, 10–16 cm. long, long-acuminate, rounded or cuneate at base, dark green above and nearly glabrous, glaucous beneath and appressed-pilose, with 6–8 pairs of veins; petiole 1–3 cm. long: fls. yellowish white in panicle-like cymes 8–14 cm. across; petals oblong; style club-shaped: fr. bluish black, globose, 6 mm. across. Fl.vii–viii; fr.x. B.M.8261

(c). S.I.1:t.77,f.1–12(c). R.H.1875:395. S.T.1:t.41. M.G.28:193(h),195. (*C. brachypoda* C. A. Mey., *C. corynostylis* Koehne, *C. ignorata* Shiras., *C. Thelicanis* Lebas.) Himal., China, Japan. Intr. 1827. Zone VI.—Handsome tree with conspicuous clusters of creamy-white fls. in summer.

C. m. × *Amomum* = **C. Horseyi** Rehd. Differs chiefly in the smaller and narrower lvs. pale or grayish green beneath and with scattered fulvous hairs on the veins and on the petiole, with fewer veins: stone broader than high. Orig. before 1919. Zone V.—*C. m.* × *asperifolia* = **C. Dunbárii** Rehd. Lvs. smaller and narrower, scabrid above and with more numerous less closely appressed hairs beneath: cymes smaller, flattish, more pubescent: fr. blue. Orig. before 1919. Zone V.

The related **C. Wilsoniàna** Wanger. from China (E.P.IV.229:66) is probably not in cult.; the plant sometimes cult. under this name is *C. Walteri*.

14. **C. paucinérvis** Hance. Shrub to 3 m.; brts. quadrangular, appressed-pubescent when young, usually reddish brown: lvs. oblong-obovate to elliptic-lanceolate, 4–10 cm. long, acute, cuneate, dark green above, lighter beneath, with appressed hairs on both sides, with 2–4 pairs of ascending veins, of thickish texture; petiole 3–5 mm. long: cymes dense, long-peduncled, 6–8 cm. across; style club-shaped: fr. sparingly produced, 5–6 mm. across, black. Fl.VII–VIII; fr.IX. G.C.III.50:95. G.M.54:593. E.P.IV.229:72. Gt.45:285. (*C. quinquenervis* Franch.) C. China. Intr. 1907. Zone (V) VI.—Nearly half-evergreen shrub with handsome foliage and attractive late fls.

C. p. × *Amomum* = **C. dúbia** Rehd. Lvs. broader with 3–4 pairs of veins sparingly ferrugineous-pubescent beneath: fr. larger, bluish black; stone ribbed. Orig. before 1920.

15. **C. pùmila** Koehne. Dense shrub to 2 m.; brts. terete, with very short internodes, glabrous: lvs. crowded, broad-ovate, 4–8 cm. long, short-acuminate, abruptly contracted at base, dark green above, paler beneath and appressed-pubescent, with 4–5 pairs of veins; petiole 6–10 mm. long: fls. white, in dense long-peduncled cymes 5–7 cm. broad; style club-shaped: fr. black. Fl.VII; fr.IX. S.H.2:f.298i-k,301e-f. (*C. mas* var. *nana* Dipp.) Orig. unknown. Cult. 1890. Zone V.

16. **C. Wálteri** Wanger. Tree to 12 m.; brts. soon glabrous, greenish yellow to brownish red: lvs. elliptic to oblong-elliptic, 5–12 cm. long, long-acuminate, cuneate, sparingly appressed-pilose above, more densely so beneath, with 4–5 pairs of veins; petiole 2–3.5 cm. long; cymes corymbose, loose after anthesis, 5–7 cm. across, sparingly appressed-pubescent or nearly glabrous, on a peduncle 1.5–2 cm. long; sepals minute; style club-shaped, about as long as stamens: fr. globose, 6–7 mm. across, black. Fl.VI; fr.IX–X. S.L. 160(h, as *C. Wilsoniana*). C. China. Intr. 1907. Zone V.

17. **C. coreàna** Wanger. Tree to 20 m.; brts. soon glabrous, reddish brown or purple: lvs. elliptic or elliptic-ovate, 6–12 cm. long, acuminate, broad-cuneate or nearly rounded at base, dark green and sparingly appressed-pilose above, more densely so beneath and paler green, with 4–5 pairs of veins; petiole 1–2 cm. long: cyme corymbose, loose, after anthesis 7–8 cm. broad; sepals about as long as disk; stamens as long as petals; style club-shaped, shorter than stamens: fr. black, 6–7 mm. across; stone subglobose. Fl.VI; fr.IX–X. J.C.31:t.3. S.H.2:f.299a(l). Korea. Intr. 1918. Zone V?

A species similar in shape and pubescence of the lvs., but more closely related to the following species is **C. austràlis** C. A. Mey. Brts. finally glabrous, purplish or greenish: lvs. ovate or elliptic-ovate, to 8 cm. long, densely pilose at first, later sparingly appressed-pilose on both sides, scabrid beneath, with 3–4 pairs of veins; petiole 7–10 mm. long: cymes dense and rather small; style clavate, as long as stamens, shorter than petals: fr. 5–6 mm. across. S.H.2:f.299c(l). (*C. sanguinea* var. *a.* Koehne.) W. Asia. Cult. 1915. Zone V.—Var. **Koenígii** Wanger. Lvs.

larger, on flowering brts. to 13 cm. long; petiole 1–2 cm. long: fr. 8–10 mm. across. S.H.2:f.299d(l). (*C. K.* Schneid.) Transcauc. Intr. 1912. Zone V?

18. **C. sanguínea** L. Red Dogwood. Shrub to 4 m., with dark red, rarely greenish brs.; lvs. broad-elliptic to ovate, 4–8 cm. long, acuminate, rounded or broad-cuneate at base, villous on both sides, more densely so and lighter green beneath, with 3–5 pairs of veins; petiole 6–15 mm. long: fls. dull white, in pubescent dense cymes 4–5 cm. across; style clavate, as long as stamens, slightly shorter than petals: fr. 6 mm. across, purple-black. Fl.v–vi; fr.ix. R.I.24:t.144(c). F.D.26:t.2704(c). S.O.2:t.66(c). Eu. Long cult. Zone V or IV?—Var. **variegàta** West. Lvs. variegated with yellowish white. S.O.2: t.66(c, l). G.W.9:247, 248(h). Orig. before 1770.—Var. **atrosanguínea** Gibbs. Brts. of deep red color.—Var. **viridíssima** Dieck. Brts. and fr. green.—Ornamental shrub chiefly valued for its dark red brs. in winter and the dark blood-red autumnal color of its lvs.

19. **C. Bretschneìderi** L. Henry. Shrub to 4 m., with yellowish or reddish brts. pubescent when young: lvs. ovate to elliptic-ovate, 5–10 cm. long, acuminate, usually rounded at base, dull green and slightly scabrid above, grayish green and loosely appressed-pubescent beneath with scabrid hairs, with 5–7 pairs of veins; petiole 8–15 mm. long: fls. creamy-white in cymes 6–10 cm. across; stamens longer than petals; style cylindric, shorter than petals: fr. bluish black, 6 mm. across. Fl.vi; fr.ix. J.13:309. S.H.2:f.298d-d[1] (l). (*C. aspera* Wanger.) N. China. Cult. 1887. Zone V.

A related species is **C. poliophýlla** Schneid. & Wanger. Shrub to 4 m.; brts. green, later brown: lvs. elliptic-ovate or elliptic, 6–12 cm. long, short-acuminate, rounded at base, deep green above and short-villous, with 7–8 pairs of veins; cymes long-peduncled, 8–10 cm. across: fr. black. S.H.2:f.298a(l). C. China. Intr. 1908. Zone V.

20. **C. mas** L. Cornelian Cherry. Shrub or small tree, to 8 m.; bark close, scaly, dark brown; young brts. minutely appressed-pilose, greenish yellow, later brown: lvs. ovate to elliptic, 4–10 cm. long, acute to acuminate, broad-cuneate at base, appressed-pilose and green on both sides, lustrous above, with 3–5 pairs of veins; petiole 5–10 mm. long: fls. yellow, in short-stalked umbels before the lvs.; bracts yellowish; pedicels about as long as bracts; sepals shorter or as long as disk: fr. ellipsoid, 1.2–1.5 cm. long, scarlet, of pleasant acid taste. Fl.iii–iv; fr.viii. B.M.2675(c). Add.3:t.101(c). R.I.24:t.143(c). M.M.5:192. G.C.II.9:399. M.A.t.80(h). (*C. mascula* Hort.) C. and S. Eu., W. Asia. Cult. since ancient times. Zone V.—Var. **aûrea** Schelle. Lvs. yellow.—Var. **elegantíssima** Nichols. Lvs. variegated with creamy-white and tinged with red. F.1877:109,t(c). G.Z.21:169. (Var. *aureo-elegantissima* Schelle, *C. mascula aurea elegantissima* Lee.)—Var. **variegàta** Loud. Lvs. bordered white. R.H.1906:420. (Var. *argenteo-marginata* Schelle.)—Var. **macrocárpa** Dipp. With larger fr.—Var. **flàva** West. With yellow fr. (f. *luteo-carpa* Wanger., var. *xanthocarpa* Bean.)—Var. **alba** West. With white fr. (f. *albo-carpa* Schneid.)—Var. **nàna** Carr. A dwarf form.—Handsome shrub or small tree chiefly planted for its very early yellow fls. and its handsome foliage remaining green until late in autumn; also for its edible fr.

21. **C. officinàlis** Sieb. & Zucc. Shrub or small tree, similar to the preceding species; to 10 m. tall; bark flaky, light brown.; lvs. ovate to elliptic, rarely ovate-lanceolate, 5–12 cm. long, acuminate, sparingly appressed-pilose above, more densely so beneath and with large fulvous axillary tufts of hairs, with 6–7 pairs of veins; petiole 6–15 mm. long: fls. yellow; pedicels up to twice as long as bracts: fr. oblong, about 1.5 cm. long, scarlet.

Fl.III–IV; fr.VIII. S.Z.1:t.50(c). Add.3:t.89(c). S.L.159(h). Japan. Cult. 1877. Zone V.

The related **C. chinénsis** Wanger. with black fr. and umbels on stalks 5–10 mm. long, from China is not yet in cult.

22. **C. flòrida** L. FLOWERING DOGWOOD. Shrub or small tree to 5, rarely to 12 m.; brts. green, soon glabrous: lvs. elliptic or ovate, 8–15 cm. long, abruptly acuminate, broad-cuneate to rounded at base, nearly glabrous above, glaucous beneath and usually only pubescent on the veins, with 6–7 pairs of veins; petiole 5–15 mm. long: fls. greenish white or yellowish; bracts 4, white or pinkish, obovate, emarginate or truncate and mucronate at apex, 4–5 cm. long, during winter enclosing the fl.-buds: fr. ellipsoid, 1 cm. long, crowned by the persistent calyx. Fl.v; fr.IX–X. Em.468(c). B.M.526(c). S.S.5:t.112, 113. Gn.52:177(h);53:222;89:286(h). F.E.23:511(h). S.L.161(h). Am. For.21:623, 786, 787(h). (*Cynoxylum floridum* Raf.) Mass. to Fla., w. to Ont., Tex. and to Mex. Cult. 1730. Zone IV.—Var. **péndula** Dipp. With pendulous brs. F.E.17:68(h).—Var. **rúbra** West. Bracts of the floral involucre red or pink. B.M.8315(c). R.H.1894:500,t(c). F.E.9:572. A.G. 18:441. Cult. in Am. 1731.—Var. **xanthocárpa** Rehd. With yellow fr.—One of the handsomest American flowering trees; the lvs. turning bright scarlet, but remaining pale beneath.

23. **C. Nuttállii** Audub. Tree to 25 m.; similar to the preceding: lvs. elliptic or ovate to obovate, 8–12 cm. long, short-acuminate, broad-cuneate, appressed-pilose on both sides while young, at maturity only beneath or glabrescent, glaucous beneath, with 5–6 pairs of veins; petiole 6–15 mm. long: involucral bracts usually 6, sometimes 4 or 5, obovate to oblong, usually acute, 5–8 cm. long, white or tinged pink, not enclosing the fl.-buds during the winter: fr. ellipsoid, 1 cm. long, bright red or orange, Fl.v; fr.IX. B.M.8311(c). S.S.5: t.214, 215. Gng.6:174. Gn.79:374, 375(h);84:228(h);89:287(h). G.C.III.63: 204(h). K.B.1915:178,t(h). B. C. to S. Calif. Intr. 1835. Zone VII or VIII. —A beautiful tree when in bloom, but has not yet been successfully grown in the eastern states, though it is doing well in s. England.

24. **C. kousa** Buerg. Tree to 7 m. with spreading brs. and slender green glabrous brts. becoming brown: lvs. elliptic-ovate, 5–9 cm. long, acuminate, cuneate, dark green above, glaucous and appressed-pilose beneath and with large axillary fulvous tufts of hairs; petiole 4–6 mm. long: fls. in a dense globose head borne on a slender stalk 4–6 cm. long; involucral bracts elliptic-ovate to oblong-ovate, 2.5–5 cm. long, acuminate, cuneate at base: head of frs. globose, pinkish, 1.5–2.5 cm. across; stone ellipsoid, 6 mm. long. Fl.VI; fr.VIII. S.Z.1:t.16(c). Add.2:t.43(c). G.C.III.19:783;68:43(h). Gn.43:152, t(c);60:165. Kew Bull.1915:179,t. (*Benthamia japonica* Sieb. & Zucc., *C. japonica* Koehne, not Thunb.) Japan, Korea. Intr. 1875. Zone V.—Var. **chinénsis** Osborn. Lvs. without or with inconspicuous axillary tufts of hairs beneath, usually larger and more pubescent: bracts 5–6 cm. long. B.M.8833 (c). Gn.89:287(h). H.B.3:258(h). China. Intr. 1907.—Handsome ornamental tree with showy white fls. in June; lvs. turning scarlet in autumn.

Subclass. II. **GAMOPETALAE** Brongn.

Perianth double, the inner whorl more or less connate, rarely distinct or wanting. (*Sympetalae* A. Br., *Metachlamydeae* Engl.)

Fam. 86. **CLETHRACEAE** Klotzsch. WHITE-ALDER FAMILY

Contains only the following genus which see for characters.

CLÉTHRA L. White-Alder. Deciduous or evergreen small shrubs or trees, with stellate pubescence; winter-buds small, pubescent: lvs. alternate, short-petioled, usually serrate, exstipulate: fls. perfect, white or pinkish, in terminal racemes or panicles; sepals 5, distinct, persistent; petals 5, distinct; stamens 10; anthers opening by a pore or a slit; ovary superior, 3-celled, with central placentae; style cylindric, slender, 3-fid at apex: fr. a 3-valved caps., many-seeded; seeds with a loose translucent cellular coat, larger than the body, albuminous. (Ancient Greek name of the Alder, given on account of the resemblance of the lvs.) About 30 species in Am., E. Asia and Madeira. —Ornamental shrubs grown for their handsome spikes of white usually fragrant fls.

A. Lvs. with 7–10 pairs of veins, 5–10 cm. long; sepals obtuse.
B. Lvs. glabrous or nearly so beneath; racemes panicled; filaments and style glabrous. 1. *C. alnifolia*
BB. Lvs. tomentose beneath; racemes sometimes solitary; style pubescent. . . 2. *C. tomentosa*
AA. Lvs. with 10–15 pairs of veins: style glabrous.
B. Racemes usually solitary; filaments pubescent; sepals acute: lvs. 8–20 cm. long. 3. *C. acuminata*
BB. Racemes panicled; filaments glabrous; sepals obtuse: lvs. 6–12 cm. long. 4. *C. barbinervis*

1. **C. alnifòlia** L. Shrub to 3 m.: lvs. obovate to obovate-oblong, 4–10 cm. long, acute to short-acuminate, cuneate, sharply serrate, glabrous or nearly so on both sides: fls. fragrant, about 8 mm. across, in pubescent upright usually panicled racemes 5–15 cm. long; pedicels 1–3 mm. long; caps. subglobose, 3 mm. across. Fl.vii–ix. Em.426,t. S.O.1:t.47(c). G.O.t.76(c). Gd.W.t.22(c). Gn.19:208,t(c). M.G.18:473, 474(h). S.L.154(h). Me. to Fla. Intr. 1731. Zone IV.—Var. **ròsea** Rehd. Fls. pinkish. Intr. 1906.—Var. **paniculàta** Nichols. Lvs. narrower, glabrous, less toothed; racemes branched. (*C. p.* Ait.) Intr. 1770.

2. **C. tomentòsa** Lam. Shrub to 3 m.: lvs. obovate, 4–10 cm. long, acute or short-acuminate, cuneate, serrate, usually chiefly above the middle, pubescent above, tomentose beneath: fls. fragrant, in pubescent solitary or panicled racemes 6–15 cm. long; pedicels 2–5 mm. long: caps. depressed-globose, 4 mm. across. Fl.viii–ix. B.M.3743(c). G.O.t.77(c). G.F.4:65. B.C.2:801. B.S.1:373. (*C. alnifolia* var. *t.* Michx.) N. C. to Fla. and Ala. Intr. 1731. Zone (V), VI.

3. **C. acuminàta** Michx. Shrub or small tree to 6 m., with upright or spreading brs.: lvs. ovate-elliptic or elliptic to elliptic-oblong, 8–20 cm. long, acuminate, broad-cuneate or rounded at base, serrulate, pubescent beneath at least on the veins: fls. secund, in usually solitary racemes 8–20 cm. long, densely pubescent; pedicels 3–8 mm. long; sepals oblong-ovate, acutish, ribbed; petals upright; filaments hairy; style glabrous: caps. ovoid, 5 mm. long, nodding. Fl.vii–ix. L.D.7:430(c). L.B.1427(c). B.T.f.685. Va. and W. Va. to Ga. and Ala., in the mts. Intr. 1806. Zone V.

4. **C. barbinérvis** Sieb. & Zucc. Shrub or tree to 10 m. with spreading brs.; brts. nearly glabrous: lvs. obovate to oblong-obovate, 6–12 cm. long, acuminate, cuneate, sharply serrate, pubescent at first on both sides, at maturity at least on the veins beneath; petiole 6–15 mm. long: fls. fragrant, in panicled pubescent racemes 10–15 cm. long; pedicels 2–6 mm. long; sepals broad-ovate, mucronulate; petals 5–6 mm. long; slightly shorter than stamens; filaments and style glabrous: caps. subglobose, 4 mm. across. Fl.vii–ix. S.I.1:t.78(c). Gt.19:654. S.H.2:f.308h-l. (*C. canescens* Auth., not Reinw.) Japan. Intr. 1870. Zone (V).

Related species are: **C. Fargèsii** Franch. Shrub to 4 m.; lvs. ovate-oblong or elliptic-oblong, 8–14 cm. long, cuneate or rounded at base, nearly glabrous; petiole

1–2.5 cm. long: racemes panicled 10–20 cm. long; sepals acute: filaments pubescent. C. China. Intr. 1900. Zone VI or VII?—**C. monostáchya** Rehd. & Wils. Closely related to the preceding species: lvs. elliptic-oblong to oblong-lanceolate, nearly glabrous: racemes usually solitary; filaments sparingly pubescent; style appressed-pilose. C. China. Intr. 1908. Zone VI or VII?—**C. Delavayi** Franch. Shrub or tree to 15 m.; brts. often red: lvs. elliptic-oblong to oblanceolate, pubescent beneath: racemes solitary; calyx red; petals about 1 cm. long, ciliate; stamens half as long as petals; filaments and style appressed-pilose. B.M.8970(c). W. China. Intr. 1913. Zone VIII?—The handsomest of the Chinese species.

Fam. 87. PYROLACEAE Dumort. SHINLEAF FAMILY

Herbs or low suffruticose plants, sometimes parasitic and without chlorophyll: lvs. alternate, exstipulate, basal or scattered: fls. perfect, regular, terminal and solitary or in corymbs or racemes; calyx 5-parted, sometimes wanting in the parasitic genera; petals distinct, 5, rarely 4; stamens 10; anthers opening by apical pores or by slits; hypogynous disk present or wanting; ovary superior, 5-celled, many-ovuled; style and stigma 1: fr. a caps. splitting into 5 valves; seed as in the preceding family.—Eleven genera and about 40 species in the boreal and temp. regions of the n. hemisphere.

CHIMÁPHILA Pursh. Evergreen suffruticose plants with creeping stem: lvs. usually crowded into irregular whorls, serrate, thickish: fls. nodding, in terminal stalked umbel-like racemes; sepals persistent, 5; petals 5, orbicular, concave, forming a saucer-shaped corolla; anthers 2-horned, opening with 2 pores; filaments short, dilated about the middle; style very short, with peltate stigma: caps. deeply furrowed, splitting from the apex downward. (Greek, *cheima*, winter, and *philein*, to love; alluding to its popular name Wintergreen.) About 8 species in N. and C. Am., Eu. and N. Asia.

A. Lvs. broadest above the middle, bright green.....1. *C. umbellata*
AA. Lvs. broadest below the middle, mottled with white.....2. *C. maculata*

1. **C. umbellàta** Nutt. WINTERGREEN. Plant 15–25 cm. high: lvs. 3–6 in a whorl, short-petioled, usually oblong-obovate, 2–4.5 cm. long, obtuse or acutish, sharply serrate with 4–13 obtusish teeth and with 3–4 slightly elevated pairs of veins beneath, bright green and lustrous above: fls. 3–6, umbellate; about 1.5 cm. across, white or pinkish; pedicels diverging during anthesis; the dilated portion of filament ciliate; caps. globose, 5–6 mm. across. Fl.VII–VIII; fr.IX. F.D.20:t.2044(c). K.D.444(a). N. and C. Eu., N. Asia to Japan. Cult. 1796. Zone III?—Var. **cisatlántica** Blake. PIPSISSEWA. Plant to 30 cm.: lvs. oblong-obovate to oblanceolate, 4–7 cm. long, acute and mucronate with 6–18 acute teeth: fls. 4–8; pedicels ascending during anthesis, more racemose. M.M.7:t.9(c). B.M.778(c). L.B.463(c). (*C. corymbosa* Pursh, in part.—Prince's Pine.) N. S. to Minn., s. to Ga. Intr. 1762.—Var. **occidentàlis** Blake. Lvs. 3–9 cm. long, acute with 10–18 acute teeth and with indistinct veins beneath: fls. 4–9; pedicels ascending, more racemose: caps. 6–7.5 mm. across. Brown & Schaeffer, Alp. Fl. Can.57. (*C. o.* Rydb.) B. C. to Cal., e. Mont. and Colo. Intr. ?

2. **C. maculàta** Pursh. Plant 8–25 cm. high: lvs. usually in threes, ovate-lanceolate to lanceolate, the lower ones ovate, 2.5–7 cm. long, acute or acuminate, rounded or cuneate at base, remotely and sharply serrate, variegated with white along the veins: fls. 2–5, white or pinkish, 1.5–2 cm. across; bracts linear; dilated portion of filaments villous: caps. depressed-globose, 7 mm. across. Fl.VI–VII. B.M.897(c). M.M.9:t.1(c). G.C.III.74:122. Gn.87:452. Me. to Ont., s. to Ga. and Ala. Intr. 1759. Zone IV?

A related species is **C. Menzièsii** Spreng. Plant 8–20 cm.: lvs. alternate or in threes, ovate to oblong-lanceolate, 2–4 cm. long, acute at ends, sharply serrate,

sometimes variegated: fls. 1–3, white, 1.2 cm. across. E.N.IV.1:8. Parsons, Wild Fl. Calif.105. B. C. to Calif. Intr. ?

Fam. 88. ERICACEAE DC. HEATH FAMILY

Shrubs or small trees, often evergreen; lvs. alternate, rarely opposite or whorled, entire or serrate, exstipulate: fls. perfect, regular or slightly irregular, solitary or in racemes, panicles or umbels: calyx 4–5-parted, persistent: corolla gamopetalous, rarely of distinct petals, often urceolate, 4–5-lobed or -parted; stamens as many or twice as many as corolla-lobes, inserted at base of a hypogynous disk; anthers opening by apical pores, rarely by slits, usually with appendages: ovary superior or inferior, 2–5-celled, many-ovuled; style and stigma 1: fr. a caps., rarely a berry or drupe; seeds minute, many in each cell, rarely only 1, albuminous, with small central embryo.—About 70 genera with 1500 species, distributed through both hemispheres, chiefly in the colder and temp. regions, also on high mts. in the tropics.

Ovary superior; calyx free: fr. a caps., rarely berry-like or a berry

A. Fr. a caps., with dry calyx.
B. Corolla of distinct petals.
C. Fls. in elongated racemes, panicles or solitary; anthers opening by slits: lvs. deciduous.
D. Petals 3 or 4; fls. in panicles or racemes.
E. Petals 3; stamens 6 ..... 1. *Tripetaleia*
EE. Petals 4; stamens 8 ..... 2. *Elliottia*
DD. Fls. solitary; petals 5; stamens 5–10 ..... 3. *Cladothamnus*
CC. Fls. in terminal umbel-like clusters; anthers opening by pores: lvs. evergreen.
D. Lvs. tomentose beneath or lepidote, 2–7 cm. long ..... 4. *Ledum*
DD. Lvs. glabrous, not exceeding 1.5 cm ..... 8. *Leiophyllum*
BB. Corolla gamopetalous.
C. Corolla deciduous.
D. Caps. septicidal.
E. Corolla without pouches for the anthers; stamens 5–16.
F. Lvs. alternate or sometimes clustered; anthers opening by pores.
G. Corolla rotate or broad-campanulate to funnel-form; stamens exserted.
H. Corolla slightly irregular, rarely rotate, usually many in terminal clusters ..... 5. *Rhododendron*
HH. Corolla regular, rotate or rotate-campanulate; stamens 10.
I. Lvs. elliptic, ciliate: fls. 1–3 ..... 10. *Rhodothamnus*
II. Lvs. linear, slightly serrulate: fls. 2–10 ..... 10a. *Phyllothamnus*
GG. Corolla globose-campanulate to cylindric; stamens inclosed.
H. Corolla globose-campanulate or urceolate, 4-or 5-lobed.
I. Fls. fascicled.
J. Lvs. broad: fls. from lateral buds, 4–5-merous ..... 6. *Menziesia*
JJ. Lvs. linear, heath-like: fls. from terminal buds, 5-merous. 12. *Phyllodoce*
II. Fls. in terminal elongated racemes, 4-merous: lvs. linear. 13. *Daboecia*
HH. Corolla cylindric, 8–10 mm. long; ovary 3-celled: fls. 1–2: lvs. 8–12 mm. long ..... 7. *Tsusiophyllum*
FF. Lvs. opposite, small: corolla deeply 5-cleft; stamens 5, included; anthers opening by slits ..... 9. *Loiseleuria*
EE. Corolla broad-campanulate or nearly rotate, with 10 pouches receiving as many anthers ..... 11. *Kalmia*
DD. Caps. loculicidal.
E. Anther-cells opening by pores or short slits at apex: upright shrubs, or prostrate shrubs with minute lvs.
F. Fls. solitary; corolla campanulate: lvs. scale-like or subulate ..... 15. *Cassiope*
FF. Fls. in umbels, racemes or panicles.
G. Calyx 5-lobed or 5-parted, the lobes valvate or separate.
H. Anthers awned.
I. Awns of anthers upright or ascending.
J. Fls. in terminal umbels or racemes.
K. Lvs. persistent, narrow: fls. in umbels; corolla urceolate: seeds numerous, oval ..... 16. *Andromeda*
KK. Lvs. deciduous, broad: fls. in racemes or umbels: seeds few in each cell, 3–5-angled ..... 14. *Enkianthus*
JJ. Fls. in lateral clusters; corolla campanulate: lvs. half-evergreen. 17. *Zenobia*
II. Awns of anthers reflexed: fls. in terminal panicles; corolla urceolate: lvs. evergreen, serrate ..... 18. *Pieris*
HH. Anthers not awned.
I. Caps. subglobose to ovoid, with thickened sutures, glabrous: fls. in racemes or clusters ..... 19. *Xolisma*

HH. Caps. conical, pubescent, sutures not thickened; flowers in large terminal panicles: lvs. deciduous, serrulate, 10–15 cm. long. 21. *Oxydendron*

GG. Calyx 5-parted, the lobes distinctly imbricate; corolla urceolate.

H. Lvs. densely scaly beneath, evergreen: fls. in leafy terminal racemes. 20. *Chamaedaphne*

HH. Lvs. not scaly, deciduous or evergreen, serrulate; racemes axillary or terminal. 22. *Leucothoe*

EE. Anther-cells opening through their whole length: evergreen trailing shrub with ovate-cordate lvs. 23. *Epigaea*

CC. Corolla persistent, 4-merous, enclosing the caps: lvs. linear, small, persistent.

D. Calyx longer than the deeply 4-parted corolla, colored. 29. *Calluna*

DD. Calyx shorter than corolla, not colored; corolla lobes short.

E. Stamens inserted at base of a high furrowed disk: fls. often axillary or in terminal clusters. 30. *Erica*

EE. Stamens adnate to base of corolla; disk minute; fls. in a dense terminal bractless spike. 31. *Bruckenthalia*

AA. Fr. a berry or surrounded by a fleshy calyx and berry-like: lvs. evergreen (except No. 28).

B. Calyx accrescent, becoming fleshy and surrounding the caps. 24. *Gaultheria*

BB. Calyx dry small, at base of the berry-like fr.

C. Anthers with short upright appendages at apex: lvs. serrulate: upright shrubs. 25. *Pernettya*

CC. Anthers with 2 long reflexed appendages: habit often prostrate.

D. Lvs. evergreen, usually entire.

E. Cells of ovary many-seeded: fr. a berry, granulated or warty: fls. in large terminal panicles: lvs. 5–12 cm. long. 26. *Arbutus*

EE. Cells of ovary 1-seeded: fr. a drupe, smooth, with several 1-seeded or 1 several-seeded stone: fls. in small panicles or racemes: lvs. rarely exceeding 5 cm. 27. *Arctostaphylos*

DD. Lvs. annual, marcescent, serrate: fr. juicy: habit prostrate; clusters few-fld. 28. *Arctous*

Ovary inferior or half-inferior: fr. a berry or berry-like drupe, crowned by the persistant calyx-lobes.

A. Fr. white; ovary free at apex: fls. 4-merous: trailing evergreen with appressed-bristly brs. and broad-elliptic lvs. 4–8 mm. long. 32. *Chiogenes*

AA. Fr. colored (only exceptionally white): ovary perfectly inferior.

B. Ovary 10-celled: fr. berry-like with 10 small nutlets: lvs. evergreen, or deciduous and resinous-dotted: upright shrubs. 33. *Gaylussacia*

BB. Ovary 4–5-celled, rarely incompletely 8–10-celled: fr. a many-seeded berry: lvs. evergreen or deciduous, not resinous-dotted; sometimes trailing. 34. *Vaccinium*

Subfam. I. RHODODENDROIDEAE Drude. Ovary superior, free from the calyx.

Tribe 1. RHODODENDREAE Spreng. Fr. a septicidal caps.: corolla deciduous, sometimes of separate petals.

1. **TRIPETALEÌA** Sieb. & Zucc. Deciduous shrubs; winter-buds with 2 or 3 outer scales: lvs. alternate, short-petioled, entire: fls. white or pinkish, in terminal racemes or panicles; sepals 3, ovate, small; petals 3, oblong; stamens 6, shorter than petals; anthers opening by a slit; ovary 3-celled, the cells many-ovuled; style slender: caps. septicidal, many-seeded. (Greek *tri-*, three in compound words, and *petalon*.) Two species in Japan.

T. paniculàta Sieb. & Zucc. Shrub to 2 m.; brts. red-brown, angled or slightly winged: lvs. rhombic-ovate or rhombic, 2.5–6 cm. long, acute, cuneate, glabrous except pubescent on the midrib beneath fls. in panicles 5–10 cm. long; bracts subulate; pedicels 2–4 mm. long; petals about 8 mm. long, white tinged with pink: caps. subglobose, 3 mm. across. Fl.VIII. N.T.1:10. S.H.2: f.311e-f,312c-d. Japan. Intr. 1892. Zone V.

A related species is **T. bracteàta** Maxim. Brts. subterete, light brown: lvs. obovate, obtuse, glabrous: fls. pink, in rarely branched racemes; bracts elliptic to obovate; pedicels 3–15 mm. long. M.I.1:t.71. N.T.1:11. S.H.2:f.311g-i,312b. Japan. Intr. 1915. Zone V?

2. **ELLIÓTTIA** Muhlenb. Deciduous shrub; winter-buds glabrous, with 2 or 3 outer scales: lvs. alternate, petioled, entire: fls. slightly irregular, white, in terminal racemes or panicles; calyx small, with 4 rounded lobes; petals 4, oblong, obtuse; stamens 8, about half as long as petals; anthers opening by a slit; style slender, curved, exserted: ovary 4-celled; cells 1-ovuled: fr.

unknown. (After Stephen Elliott, American botanist who wrote a flora of S. Carolina; 1771–1830.) One species in E. N. Am.

E. racemòsa Muhlenb. Shrub to 3 m. or sometimes small tree to 6 m., with slender upright brs. puberulous when young: lvs. oblong or elliptic-oblong, 7–10 cm. long, acute at ends, glandular-mucronate, dull green and glabrous above, paler and sparingly hairy beneath; petiole slender, pubescent, 8–12 mm. long: racemes loose, 10–25 cm. long; pedicels slender, 6–12 mm. long, the lower ones sometimes branched; petals 1–1.5 cm. long; fls. slightly fragrant. Fl.VII. B.M.8413(c). S.S.14:t.712. G.F.7:205. G.C.III.51:11;78: 49. Gn.75:471. S.L.193(h). S. C. and Ga. Cult. 1813. Zone VII?—Handsome graceful shrub with fragrant white fls. in summer.

3. **CLADOTHÁMNUS** Bong. Deciduous shrub; winter-buds with 2 or 3 outer scales: lvs. alternate, subsessile, entire: fls. pink, regular, 1–3, terminal, nodding; sepals 5, narrow-oblong, green; petals 5, oblong; stamens 10; anthers opening by a short slit; style slender, shorter than petals: caps. 5–6-celled, many-seeded. (Greek *klados*, branch, and *thamnus*, shrub.) One species in N. W. Am.

C. pyrolaeflòrus Bong. Upright much-branched shrub to 3 m.; brts. glabrous, red-brown, angled; lvs. obovate-oblong to oblanceolate, 3–6 cm. long, mucronate, narrowed toward the base, glabrous: fls. usually solitary, 2–2.5 cm. across, pink, yellow toward the end of petals; pedicels 6–12 mm. long: caps. subglobose, 6–7 mm. across, surrounded and exceeded by the leafy sepals. Fl.VI. B.M.8353(c). G.F.10:215. S.H.2:f.312e,313a-d. Alaska to Ore. Cult. 1910. Zone VI?

4. **LÈDUM** L. Evergreen shrubs; winter-buds ovoid, with several scales: lvs. alternate, short-petioled, entire, often revolute, tomentose or glandular beneath: fls. rather small, white, on slender pedicels in umbel-like terminal clusters; calyx-lobes 5, short and broad; petals 5, spreading; stamens 5–10, with slender filaments; anthers opening by apical pores; ovary 5-celled; style elongated; caps. opening from the base to the apex into 5 valves. (Ledon is the Greek name of Cistus.) Probably only 3 species in the colder regions of the n. hemisphere.

A. Lvs. tomentose beneath, revolute at the margin.
  B. Stamens 7–11: lvs. linear to linear-oblong, sometimes oblong, the midrib more or less visible ..... 1. *L. palustre*
  BB. Stamens 5–8: lvs. elliptic to oblong, densely rusty-tomentose beneath, the midrib not visible ..... 2. *L. groenlandicum*
AA. Lvs. lepidote-glandular and glaucous beneath, not or slightly revolute .. 3. *L. glandulosum*

1. **L. palústre** L. Wild Rosemary. Upright shrub to 1 m.; young brts. rusty-tomentose: lvs. linear to linear-oblong, 1–4.5 cm. long, strongly revolute, dark green and somewhat rugose above, rusty-tomentose beneath: fls. 1–1.5 cm. across, in a dense terminal cluster; pedicels glandular-villous; petals oval; stamens usually 10: caps. ovoid, 4–5 mm. long. Fl.V–VI. S.O.3:163(c). F.D. 20t.2033(c). L.B.6:560(c). S.L.242(h). N. Eu. and N. Asia. Intr. 1762. Zone I. —Var. **decúmbens** Ait. Decumbent, densely branched shrub: lvs. linear, 1–1.5 cm. long. B.B.2:677. Arctic Am., N. E. Asia. Intr. 1762.—Var. **dilatàtum** Wahlbg. Upright shrub: lvs. usually oblong, 2–7 cm. long, less revolute, exposing a short white tomentum, the rusty pubescence often restricted to the midrib and veins. N.K.8:t.1,2. (*L. d.* Rupr., *L. pacificum* Small.) N. Eu. to Japan; Sitka. Cult. 1902.

2. **L. groenlándicum** Oed. Labrador Tea. Upright shrub to 1 m.; young brts. rusty-tomentose: lvs. elliptic to oblong or narrow-oblong, 2–5 cm. long,

obtuse, densely rusty-tomentose beneath: fls. 1.5 cm. across; pedicels minutely puberulous; calyx-lobes acute or acutish; petals oblong: caps. oblong, 5–6.5 mm. long. Fl.v–vi. G.O.t.50(c). S.O.3:t.164(c). L.B.534(c);1049(c). B.S. 2:13. M.G.21:74(h). (*L. latifolium* Ait.) Greenl. to Alb. and Wash., s. to Pa. and Wisc. Intr. 1763. Zone I.—Var. **compáctum** Bean. Dwarf, with short brs., shorter and broader lvs. and smaller fl.-clusters.

3. **L. glandulòsum** Nutt. Shrub to 2 m.: brts. puberulous: lvs. elliptic or ovate to oblong, 1.5–5 cm. long, obtuse, not revolute, dark green above, glaucous and resinous-lepidote beneath; petiole 4–6 mm. long: fls. 1.2 cm. across; pedicels slender; calyx-lobes obtuse; petals suborbicular to oblong; stamens 10: caps. subglobose to ovoid, 3–4 mm. long. Fl.v–vi. B.M.7610(c). Alb. and B. C. to Wyo. and Calif. Intr. 1894. Zone V or VI?

Perhaps not specifically distinct is **L. columbiànum** Piper. Lvs. oblong, 4–6 cm. long, slightly revolute; stamens 5–7: caps. oblong, 5 mm. long. Wash. to Ore. Intr. ?

5. **RHODODÉNDRON** L. Evergreen or deciduous shrubs, rarely trees; buds with several to many imbricate scales: lvs. alternate, petioled, entire, rarely ciliate-serrulate: fls. pediceled, usually in terminal umbel-like racemes, sometimes solitary or few, rarely from lateral buds; calyx 5-parted, often very small, rarely 6–10-parted; corolla rotate to campanulate or funnelform, sometimes tubular, usually slightly irregular, with 5-, rarely 6–10-lobed limb, rarely some of the lobes divided to the base; stamens 5–10, rarely more; anthers opening with apical pores; ovary 5–10-celled; cells many-ovuled; style slender with capitate stigma; caps. usually ovoid to oblong, septicidal; seeds minute, numerous. (Greek *rhodon*, rose and *dendron*, tree; the ancient Greek name of *Nerium Oleander*.) Including *Azalea* L., *Rhodora* L., *Therorhodion* Small, *Azaleastrum* Rydb. and *Biltia* Small.) More than 400 species distributed through the colder and temp. regions of the n. hemisphere, also on the high mts. of s. Asia and Malaysia and extending to N. Guinea and Austr.; 26 species known in N. Am., but none extending into Mex.—Rhododendrons and Azaleas are much planted for their beautiful fls. and the evergreen species also for their foliage; they demand, with few exceptions, soil free from lime. Many hybrids have originated in cult. and make the classification and determination of the garden forms difficult. To give a fairly complete record of this ever increasing number of hybrids is manifestly impossible within the scope of this Manual and only the more important and better known forms are mentioned. Also the many new species recently introduced from S. W. China and found only in a few large collections in England, whose hardiness within our area has not yet been tested, have been omitted. Descriptions of most of them will be found in Millais, Rhododendrons, 2 vols. (1914–24).

A. Lvs. evergreen, glabrous, lepidote or tomentose, not ciliate or ciliate and lepidote, rarely deciduous and lepidote; stamens 5–20; ovary glabrous, lepidote or tomentose, not setose, sometimes more than 5-celled. (See also × Subgen. Azaleodendron with half-evergreen lvs.) ..... Subgen. I. EURHODODENDRON
  B. Fls. several or many from a terminal bud, rarely with additional lateral clusters: lvs. persistent.
    C. Lvs. not lepidote, glabrous or tomentose beneath, never less than 5 cm. long; ovary glabrous, glandular or tomentose, never lepidote; stamens 10–20. . Sect. 1. Leiorhodion
    CC. Lvs. lepidote, sometimes less than 5 cm. long: ovary lepidote.
      D. Corolla rotate or campanulate to funnelform; stamens 10. . . . Sect. 2. Lepipherum
      DD. Corolla salver-shaped, with spreading limb and cylindric tube, villous within; stamens 5–10: lvs. 1–7 cm. long ..... Sect. 3. Pogonanthum
  BB. Fls. solitary or few from lateral buds clustered at end of brts: lvs. usually deciduous, lepidote: corolla rotate-campanulate; stamens 10 ..... Sect. 4. Rhodorastrum
AA. Lvs. deciduous, pubescent, often strigose and ciliate, never lepidote, sometimes persistent and strigose; stamens 5–10; ovary setose, rarely glabrous, 5-celled (see also × Subgen. Azaleodendron with half-evergreen lvs.)

B. Fls. from leafless terminal or lateral buds, solitary to many in umbel-like racemes; bracts deciduous; stamens 5–10: upright shrubs.
C. Fls. solitary or 2 from lateral buds clustered at end of brts.; stamens 5: lvs. deciduous. Subgen. II. AZALEASTRUM
CC. Fls. in terminal usually many-fld. clusters, rarely solitary Subgen. III. ANTHODENDRON
D. Fls. and leafy brts. from the same terminal bud; fls. 1–3, rarely more.
E. Brts. with flattened appressed setose hairs: lvs. persistent or sometimes deciduous, scattered: stamens 5–10 ..... Sect. 1. TSUTSUTSI
EE. Brts. glabrous or villous: lvs. deciduous, clustered at end of brts., scattered only on vigorous shoots: stamens 8–10 ..... Sect. 2. SCIADORHODION
DD. Fls. from terminal buds, lvs. from distinct lateral buds below.
E. Stamens 8–10; corolla rotate-campanulate, sometimes with 1–3 of the lobes divided to or nearly to the base ..... Sect. 3. RHODORA
EE. Stamens 5; corolla funnelform ..... Sect. 4. PENTANTHERA
BB. Fls. on a leafy-bracted peduncle, solitary or in 2–3-fld. racemes with leafy bracts; corolla rotate; stamens 10: procumbent small shrub ..... Subgen. IV. THERORHODION

Subgen. I. EURHODODENDRON

Sect. 1. LEIORHODION

A. Under side of lvs. glabrous or pubescent only when young, or only on the midrib.
B. Stamens 10; corolla 5-lobed.
C. Lvs. quite glabrous beneath.
D. Ovary glandular, not pubescent; sepals partly as long as ovary .... 1. *R. ponticum*
DD. Ovary tomentose or villous.
E. Fls. pale yellow; bud-scales persistent ..... 2. *R. chrysanthum*
EE. Fls. pink or purple to white: bud-scales deciduous.
F. Calyx-lobes much shorter than ovary.
G. Pedicels glabrous; ovary rusty-hirsute: lvs. acute at ends. 3. *R. californicum*
GG. Pedicels pubescent; ovary glandular-pubescent: lvs. obtuse or obtusish at ends ..... 4. *R. catawbiense*
FF. Calyx-lobes as long or nearly as long as ovary (see also 10. *R. maximum*): lvs. obtuse, auriculate at base, 5–8 cm. long ..... 5. *R. Souliei*
CC. Lvs. on the midrib clothed with brown shaggy tomentum like the young brts. 6. *R. longesquamatum*
BB. Stamens more than 10; corolla 6–8-lobed, rarely 5-lobed; ovary 7–8-celled.
C. Lvs. cuneate at base, glaucous beneath; filaments glabrous ..... 7. *R. discolor*
CC. Lvs. rounded or subcordate at base ..... 8. *R. Fortunei*
AA. Under side of lvs. tomentose or pubescent.
B. Corolla 7-lobed: lvs. auriculate at base ..... 9. *R. auriculatum*
BB. Corolla 5-lobed.
C. Ovary tomentose; brts. tomentose to nearly glabrous.
D. Lvs. cuneate at base.
E. Sepals as long or nearly as long as ovary: lvs. 10–25 cm. long, with thin close tomentum, rarely glabrous ..... 10. *R. maximum*
EE. Sepals very short: lvs. 5–14 cm. long.
F. Petioles and young brts. tomentose: lvs. woolly-tomentose beneath. 11. *R. Smirnovi*
FF. Petioles and young brts. glabrous or nearly so: lvs. with close tomentum beneath.
G. Tomentum of lvs. thin and lateral veins visible beneath: bud-scales persistent at base of brts.: corolla spotted ..... 12. *R. caucasicum*
GG. Tomentum of lvs. thick, lateral veins not visible: bud-scales deciduous: corolla not spotted, sometimes 7-lobed ..... 13. *R. Metternichii*
DD. Lvs. rounded or auriculate at base: corolla pale yellow to pinkish, spotted. 14. *R. brachycarpum*
CC. Ovary glabrous; brts. glabrous: lvs. obtuse at ends.
D. Corolla spotted, 3–5 cm. across: lvs. ovate to elliptic-obovate, 5–9 cm. long. 15. *R. Przewalskii*
DD. Corolla slightly spotted, 5–7 cm. across: lvs. oblong or elliptic-oblong, 7–12 cm. long ..... 16. *R. campanulatum*

Sect. 2. LEPIPHERUM

A. Fls. 2.5–5 cm. across: lvs. usually longer than 2.5 cm.
B. Fls. yellow; stamens exserted ..... 17. *R. Keiskei*
BB. Fls. pink to purple, rarely white.
C. Lvs. hirsute on midrib beneath ..... 18. *R. Augustini*
CC. Lvs. glabrous beneath.
D. Fls. usually partly in axillary clusters below the terminal one.
E. Lvs. densely scaly beneath and glaucous beneath: fls. pink 19. *R. Davidsonianum*
EE. Lvs. slightly scaly beneath and green: fls. white or slightly pinkish. 20. *R. yunnanense*
DD. Fls. only in terminal clusters.
E. Style longer than stamens ..... 21. *R. yanthinum*

EE. Styles shorter than stamens.
F. Tube of corolla shorter or as long as lobes, slightly or not lepidote outside. 22. *R. carolinianum*
FF. Tube of corolla longer than lobes, lepidote outside.
G. Corolla about 2.5–3 cm. across: style about 2 cm. long: lvs. 4–10 cm. long. 23. *R. minus*
GG. Corolla 2–2.5 cm. long; style about 1 cm. long: lvs. 2–6 cm. long. 24. *R. myrtifolium*

AA. Fls. 1–2 cm. across.
B. Corolla-tube cylindric, longer than limb.
C. Style at least 3 times as long as ovary: fls. about 2 cm. across....24. *R. myrtifolium*
CC. Style scarcely twice as long as ovary; fls. about 1.5 cm. across.
D. Lvs. not ciliate; calyx very short.....25. *R. ferrugineum*
DD. Lvs. ciliate; calyx 2.5–3.5 mm. long.....26. *R. hirsutum*
BB. Corolla-tube about as long as limb.
C. Stamens about as long as tube.....27. *R. intricatum*
CC. Stamens longer than tube.
D. Stamens 5–8: procumbent shrub.....28. *R. lapponicum*
DD. Stamens 10: upright shrubs.
E. Fls. rosy-purple; stamens slightly shorter than lobes.....29. *R. parviflorum*
EE. Fls. white; stamens much longer than corolla.....30. *R. micranthum*

Sect. 3. Pogonanthum

A. Stamens 5.....21. *R. cephalanthum*
AA. Stamens 10.....32. *R. Collettianum*

Sect. 4. Rhodorastrum

A. Lvs. persistent: fl.-clusters many, racemosely arranged.....33. *R. racemosum*
AA. Lvs. deciduous or half-evergreen: fl.-clusters few at end of brts.....34. *R. dauricum*

Subgen. II. AZALEASTRUM

35. *R. albiflorum*

Subgen. III. ANTHODENDRON

Sect. 1. Tsutsutsi

A. Brts. densely clothed with flattened appressed hairs.
B. Scales of fl.-buds not viscid.
C. Corolla with cylindric tube and spreading lobes, white, small; stamens 5 or 4. 36. *R. Tschonoskii*
CC. Corolla funnelform-campanulate, 1.8–5 cm. across.
D. Stamens 5.
E. Lvs. crenulate, elliptic-lanceolate to linear-lanceolate.....37. *R. indicum*
EE. Lvs. elliptic or obovate to lanceolate, entire.....38. *R. obtusum*
DD. Stamens 10: lvs. elliptic to elliptic-oblong, 2–5 cm. long.....39. *R. Simsii*
BB. Scales of fl.-buds viscid; stamens 10: lvs. deciduous.....40. *R. yedoense*
AA. Brts. with few appressed hairs and many spreading often glandular hairs: bud-scalas viscid.
B. Stamens 8–10: fls. white to pale purple.....41. *R. mucronatum*
BB. Stamens 5: fls. pink to pale rosy-purple.....42. *R. linearifolium*

Sect. 2. Sciadorhodion

A. Lvs. rhombic, 2–3 at end of brts.
B. Stamens subequal; corolla red; style villous.....43. *R. Weyrichii*
BB. Stamens unequal, often declinate; style glabrous or glandular.....44. *R. reticulatum*
AA. Lvs. broad-elliptic to obovate, 4–5 at end of brts.
B. Corolla white; style glabrous: lvs. 3–5 cm. long.....45. *R. quinquefolium*
BB. Corolla pink; style glandular: lvs. 5–10 cm. long.....46. *R. Schlippenbachii*

Sect. 3. Rhodora

A. Corolla not divided to base.
B. Stamens 10; corolla not spotted.
C. Lvs. obovate to oblong-oblanceolate, pubescent beneath: fls. 3–6, magenta. 47. *R. Albrechti*
CC. Lvs. elliptic to narrow-elliptic, glabrescent: fls. 1–2, rose-pink....48. *R. pentaphyllum*
BB. Stamens 5–7: fls. pink or whitish, spotted: lvs. glabrous and green beneath.49. *R. Vaseyi*
AA. Corolla divided to base; stamens 10: lvs. tomentulose beneath.....50. *R. canadense*

Sect. 4. Pentanthera

A. Corolla yellow or with large yellow blotch on upper lip.
B. Corolla wide-funnelform, not glandular outside, the yellow blotch divided by lighter veins into smaller dots.
C. Lvs. glabrous beneath except on veins: winter-buds glabrous; stamens shorter than corolla.....51. *R. japonicum*
CC. Lvs. soft-pubescent beneath: winter-buds pubescent: stamens as long as the yellow corolla.....52. *R. molle*
BB. Corolla funnelform, with cylindric tube: blotch not dissolved into dots.
C. Corolla glandular outside.
D. Tube narrow, much longer than the lobes: corolla yellow, very fragrant. 53. *R. lutum*

DD. Tube gradually dilated above the middle.
E. Corolla white or pinkish; stamens about as long as lobes; tube often longer than lobes.....54. *R. occidentale*
EE. Corolla yellow or orange to scarlet; stamens longer than lobes: tube about as long as lobes.....55. *R. calendulaceum*
CC. Corolla finely pubescent and glandless outside, red to scarlet; tube longer than lobes. 56. *R. speciosum*
AA. Corolla white to deep pink or carmine, without or with two small yellow markings at base of upper lobe.
B. Fls. before or with the lvs.: corolla-tube pubescent inside.
C. Fl.-buds without prominent rows of stipitate glands outside.
D. Lvs. glabrous beneath or pilose only on midrib.....57. *R. nudiflorum*
DD. Lvs. pubescent beneath.....58. *R. roseum*
CC. Fl.-buds with prominent rows of stipitate glands outside; tube glabrous inside. 59. *R. atlanticum*
BB. Fls. appearing after the lvs. are fully developed; corolla-tube glabrous inside or slightly pubescent.
C. Brts. more or less strigose and pubescent: style usually pubescent. .60. *R. viscosum*
CC. Brts. and lvs. glabrous or the latter strigillose on midrib beneath: style usually glabrous.....61. *R. arborescens*

Subgen. IV. THERORHODION

62. *R. kamtschaticum*

Subgen. EURHODODENDRON Endl.

Sect. 1. LEIORHODIUM Rehd.

1. R. pónticum L. Shrub to 3 m.; brts. puberulous at first, soon glabrous: lvs. elliptic to oblong, 6–12 cm. long, acute at ends, pale green beneath, glabrous: fls. many; corolla about 5 cm. across, lilac-purple, spotted brownish; upper calyx-lobes as long as ovary, lower ones half as long; pedicels longer than corolla, puberulous; ovary finely glandular. Fl.v–vi. B.M.650(c). Reichenbach, Fl. Exot.2:t.38(c). (*R. baeticum* Boiss. & Reut.) Asia Minor, Spain and Portugal. Intr. 1763 (from Gibraltar). Zone VII?—Var. **album** Sweet. Fls. white.—Var. **ròseum** Sweet. Fls. rose-purple.

R. p. × *arboreum* = **R. Smithii** Sweet. Fls. rose-purple. B.F.2:t.50(c).—*R. p.* × *catawbiense* = *R. Morelianum;* see under No. 4.—*R. p.* × *caucasicum;* see under No. 12.—*R. p.* × *nudiflorum* = *R. azaleoides;* see p. 691.

2. **R. chrysánthum** Pallas. Much-branched shrub to 1 m., glabrous; brts. stout, partly covered by the persistent bud-scales: lvs. elliptic to ovate-lanceolate or oblong-obovate, 2.5–8 cm. long, obtuse and mucronulate, cuneate, slightly revolute, rugulose above, light green beneath; petioles stout, 1–1.5 cm. long: fls. 5–8, subtended by persistent bud-scales; corolla funnelform-campanulate, 2.5–3 cm. across, pale yellow; sepals minute, rounded, pubescent; pedicels floccose-tomentose, 4–6 cm. long; filaments villous at base; ovary rufous-tomentose; style glabrous. Fl.v–vi. Woodville, Med. Bot. 3:t.149(c). Hooker, Parad. Lond.2:t.80(c). N.K.8:t.13. N.T.1:56. Altai to Kamtchatka, Korea, Japan. Intr. 1796. Zone II or I.—Difficult to grow and rare in cult.

3. **R. californicum** Hook. Shrub to 3 m., sometimes to 6 m., glabrous: lvs. oblong, 8–15 cm. long, short-acuminate, cuneate; petiole 1.5–2.5 cm. long: fls. many; corolla campanulate, 5–6 cm. across, rosy-purple, spotted red-brown; lobes wavy; sepals short and broad or the upper long-pointed; stamens pubescent at base, shorter than corolla; anthers purple; ovary white-silky; pedicels 3–5 long, glabrous. Fl.v–vi. B.M.4863(c). B.T.754. Gn.M.42: 279(h). (*R. macrophyllum* Don, *R. californicum* var. *Washingtonianum* Zabel, *R. Washingtonianum* Zabel.) B. C. to Calif. Intr. 1850. Zone VI or VII?—*R. macrophyllum* is sometimes distinguished by its smaller white fls., larger more pointed lvs. and smaller caps.

4. **R. catawbiénse** Michx. Spreading shrub to 2, rarely to 6 m.: lvs. elliptic to oblong, 6–12 cm. long, obtuse and mucronulate, rounded at base, lustrous

above, whitish beneath, glabrous; petioles 1.5–3 cm. long: fls. many; corolla broad-campanulate, 6 cm. across, lilac-purple, spotted olive-green, with broad roundish lobes; sepals short, triangular; pedicels rusty-pubescent and glandular; filaments pubescent at base, whitish; style red; ovary rusty-tomentose. Fl.v–vi. B.M.1671(c). L.B.1176(c). Gn.M.2:18. F.E.7:312,t.71(h). M.G. 17:381(h). Va. to Ga.; in the mts. Intr. 1809. Zone V.—One of the most beautiful native shrubs covering extensive tracts on the higher mts. of the s. Alleghanies.—Var. **album** Waterer. Fls. white.

R. c. × *ponticum* = **R. Moreliànum** Lem. Fls. lilac-violet. H.U. 4:1, t (c). L.D.II.3:53(c). Orig. before 1826. Here belongs "*Everestianum*" (G.26:103. S.L.341[h]) and "*Fastuosum fl. pleno*" (F.S.2:t.143[c], Watson, Rhod.38.t[c]). —*R.* (*c.* × *ponticum*) × *arboreum* = **R. altaclarénse** Lindl. Fls. crimson. B.R. 1414(c). Orig. 1826.—*R. c.* × *arboreum* = **R. Russelliànum** Sweet. Fls. crimson: lvs. tomentose beneath. S.B.4:t.9[c].—Var. **album** Millais. Fls. white.—*R. c.* × *caucasicum* = **R. Stanwelliànum** Methven. Fls. blush.—*R. c.* × *maximum* = **R. wellesleyànum** Waterer. Lvs. oblong-lanceolate, glabrous or glabrate beneath: sepals ovate: fls. white, slightly tinged pink. Cult. 1880.—Many forms of uncertain parentage are in cultivation under the general designation "Catawbiense Hybrids." S.L.340–342(h),t.13(hc).

5. **R. Souliêi** Franch. Shrub to 3 m.; young brts. purplish, viscid; lvs. broad-ovate, 5–8 cm. long, rounded and mucronate at apex, bluish green, glabrous: fls. about 6; corolla pale rose or white, cup-shaped, 5–7 cm. across, with 5 or sometimes 6 broad short lobes; stamens 8–10; style and ovary glandular; calyx-lobes unequal, oblong, obtuse, glandular; pedicels 3–5 cm. long. Fl.v–vi. B.M.8622(c). G.C.III.45:380. Gn.73:278. J.L.35:137. W. China. Intr. 1905. Zone VII?

6. **R. longesquamàtum** Schneid. Shrub to 3 m.; young brts. covered with brown shaggy hairs; scales of buds persistent: lvs. obovate-oblong, 6–12 cm. long, acute, rounded or subcordate at base, dark green above, on midrib beneath densely rufous-villous like the petioles: fls. 6–15; corolla broad-campanulate, 5–6 cm. across, pink with dark red blotch; stamens shorter than corolla, pubescent at base; sepals densely rufous-villous and glandular like the pedicels. Fl.vii. (*R. Brettii* Hemsl.) W. China. Intr. 1904. Zone VII?

Related species are **R. pachýtrichum** Franch. Brts. with brown bristly hairs: lvs. narrow-oblong to oblong-ovate, 8–15 cm. long, rufous-pubescent on midrib beneath and on petioles; corolla 3–4 cm. across, campanulate, pale pink to white; sepals small, triangular; pedicels shaggy. W. China. Intr. 1903. Zone VI or VII? —**R. strigillósum** Franch. Shrub to 6 m.; young brts. with white bristly hairs: lvs. oblong-lanceolate, 7–14 cm. long, acuminate, cordate, with brown bristly hairs beneath chiefly on midrib: fls. campanulate, red, sometimes white, 3.5 cm. across; filaments glabrous; pedicels and calyx bristly. B.M.8864(c). W. China. Intr. 1904. Zone VII or VIII?

7. **R. díscolor** Franch. Shrub to 5 m., quite glabrous; young shoots yellowish: lvs. narrow-elliptic to oblong-lanceolate, 10–20 cm. long, acute and mucronulate, cuneate or sometimes subcordate, dark grren above, whitish beneath; petiole 1.5–3 cm. long, purplish: fls. many; corolla funnelform-campanulate, white to pale pink, 6–7 cm. across, with 6–7 lobes; stamens 12–14; filaments glabrous; ovary and style glandular; calyx small, ciliate; caps. 3 5 cm. long. Fl.vi. B.M.8696(c). G.C.III.72:21. Gn.84:270. Millais, Rhod.2:128,t(h). C. China. Intr. 1900. Zone VI or VII.—Var. **cárneum** Wils. Fls. bright pink.

R. d. × *catawbiense hybr.* = **R. holmleaénse** Rehd. Lvs. shorter and broader; corolla 5–6-lobed; stamens 10–12; ovary 8-celled, sometimes 6–7-celled. Orig. 1915. Zone (V).

Related species are: **R. calóphytum** Franch. Tree to 12 m.; brts. gray-pubescent: lvs. oblong-obovate to oblanceolate, 20–30 cm. long, acuminulate, cuneate, slightly pubescent on midrib beneath at first: corolla 7–8-lobed, white to rose-color with dark blotch; stamens 16–20, glabrous; ovary glabrous. Millais, Rhod.2:96(h),

260,t(c). Gn.86:215. G.C.III.77:431. W. China. Intr. 1904. Zone VII or VIII. —**R. sutchuenénse** Franch. Shrub to 5 m.; young brts. gray-pubescent: lvs. oblong-oblanceolate, 12–25 cm. long, acute or obtusish, cuneate, slightly pubescent on midrib beneath: fls. pale pink to rosy-lilac, spotted purple; corolla 5-lobed, stamens 12–15, pubescent at base; ovary glabrous. B.M.8362(c). G.C.III.73:171. Gn.87:159. R.H.1922:150(h)t(c). C. China. Intr. 1901. Zone VII or VIII.—Var. **Geràldii** Hutchins. Fls. with a dark red-purple blotch. G.C.III.73:159. Gn.84:115. (*R. praevernum* Hutchins.)

8. **R. Fortùnei** Lindl. Shrub to 4 m.; brts. smooth: lvs. oblong, 10–20 cm. long, abruptly pointed, rounded or subcordate, rarely cuneate, light green above, glaucescent beneath, glabrous; petiole 1–2.5 cm. long, purplish: fls. racemose, rosy-lilac or blush, 7-lobed, fragrant; calyx minute; stamens 14–16, glabrous; ovary and style sparsely glandular; pedicels slender, stipitate-glandular. Fl.v–vi. B.M.5596(c). E. China. Intr. 1859. Zone VI or VII. —Var. **Houlstònii** Rehd. & Wils. Lvs. smaller and narrower: fls. pink; pedicels more glandular; ovary and style at base glandular-pubescent. (*R. H.* Hemsl. & Wils.) C. China. Intr. 1900.

Related species are: **R. Davìdi** Franch. Brts. glabrous: lvs. oblong, 8–16 cm. long, obtuse and mucronulate, broad-cuneate, pale green or brownish beneath: fls. racemose, broad-campanulate, 7-lobed, lilac-purple, spotted; stamens 14; ovary glandular; pedicels glandular. W. China. Intr. 1904. Zone VII?—**R. oreodóxa** Franch. Young brts. glandular-hairy: lvs. oblong, 6–8 cm. long, obtuse, subcordate, yellowish green beneath, glabrous: fls. campanulate-funnelform, 5 cm. across, 7–8-lobed, deep red changing to carmine and lilac; stamens 14; anthers purple; style and ovary glabrous; pedicels glandular. B.M.8518(c). G.C.III.71: 239. Gn.84:170;85:225. (*R. haematochilum* Craib.) W. China. Intr. 1904. Zone VII?—**R. decòrum** Franch. Lvs. elliptic-oblong to oblong, 6–12 cm. long, rounded or abruptly contracted at base, glaucous beneath; corolla white to pink, spotted green, 5 cm. across; stamens 12–16, pubescent at base; style glandular or glabrous; pedicels usually stipitate-glandular. B.M.8643,8659,8834(c). G.C.III.47:120,t. R.H.1914:305. Millais, Rhod.2:28,t(h). (*R. lucidum* Franch., *R. vernicosum* Franch., *R. erubescens* Hutchins.) W. China. Intr. 1904. Zone VII?—**R. Fargèsii** Franch. Lvs. elliptic to ovate-oblong, 5–8 cm. long, obtuse, subcordate, dull gray-green above, glaucous beneath: fls. about 5 cm. across, 7-lobed, white to rosy pink, often spotted; stamens 12–14, glabrous; style glabrous, longer than stamens; ovary and pedicels glandular. B.M.8736(c). G.C.III.52:4:71:42, 239. Gn.84:403. C. China. Intr. 1901. Zone VII?—**R. orbiculàre** Decne. Young brts. purplish, glandular: lvs. suborbicular to broad-ovate, 5–10 cm. long, rounded and mucronate at apex, cordate, glaucous beneath, glabrous: fls. broad-campanulate, 5 cm. across, rosy-red, 7-lobed; stamens 14; ovary glandular; style and pedicels glabrous. B.M.8775(c). G.C.III.71:274. (*R. rotundifolium* David.) W. China. Intr. 1904. Zone VII.—**R. Shéltonae** Hemsl. & Wils. Young brts. glabrous, brown: lvs. oval or ovate, 6–10 cm. long, abruptly acute, rounded at base, glaucous beneath; petiole 1.5–2.5 cm. long: fls. broad-campanulate, 7-lobed, pink; stamens 12–14; ovary and style glandular; pedicels glandular. W. China. Intr. 1904. Zone VII?

9. **R. auriculàtum** Hemsl. Shrub to 7 m.; winter-buds with acuminate or aristate scales; brts. stipitate-glandular: lvs. oblong, 12–30 cm. long, obtuse and apiculate, auriculate at base, dark green above, rusty-tomentose beneath; petiole glandular-pubescent: fls. 8–15, fragrant; pedicels 2.5–3.5 cm. long, glandular-villous; calyx with short glandular-pubescent lobes; corolla white to pinkish, spotted with green or rose-color, campanulate-funnelform, 7-lobed, 6–9 cm. wide; stamens 14, glabrous; style longer than stamens, shorter than corolla, glandular; ovary glandular. Fl.viii. B.M.8786(c). Gn.86:455;87:539. Millais, Rhod.2:48,t(h). C. China. Intr. 1900. Zone VII?—Var. **róseum** Wils. Fls. rose-pink.

10. **R. máximum** L. Large shrub or small tree to 12 m.; young brts. pubescent: lvs. oblong-obovate or oblong to lanceolate-oblong, 10–20 cm. long, acute or short-acuminate, cuneate, dark green above, paler beneath and with close thin tomentum, rarely nearly glabrous; petiole 1.5–2.5 cm.

long, pubescent when young: fls. many; corolla rose-colored to purple-pink, spotted olive-green to orange, campanulate, 3.5–4 cm. across, deeply lobed with oval flat lobes; filaments pilose near base; ovary glandular-pubescent; style glabrous; sepals ovate; pedicels glandular-pubescent. Fl.VI–VII. B.M. 951(c). Em.435,t(c). S.S.5:t.238–9. M.M.1:t.1(c). C.L.4:105. Gn.87:540(h). N. S. and Ont. to Ga., Ala. and Ohio. Intr. 1736. Zone IV.—Var. **album** Pursh. Fls. white. (*R. Purshii* Don.)—Var. **purpúreum** Pursh. Fls. deep pink to purple. (*R. p.* Don.)—The form with white fls. tinged pink (var. *ròseum* Pursh) is considered the typical form.

R. m. × *catawbiense* = *R. wellesleyanum;* see under No. 4.—*R. m.* × *ponticum* = **R. intermèdium** Wender. Orig. before 1826.—*R. m.* × *arboreum* = **R. Cunninghâmi** T. Moore. Lvs. brown-tomentose beneath. Fls. white with dark purple spots. G.M.B.1851:121,t(c). P.F.1:t.16(c). (*R. cinnamomeum* var. *C.* Paxt.) Orig. before 1850.

11. **R. Smirnòvi** Trautv. Shrub or small tree to 6 m.; young brts. white-tomentose: lvs. oblong, 8–15 cm. long, acutish or obtuse, cuneate, dark green and finally glabrous above, with thick woolly tomentum beneath white at first later pale brown; petioles 8–18 mm. long, tomentose: fls. many; corolla rosy-red, campanulate-funnelform, 6–7 mm. across, lobes longer than tube, with frilled, darker colored margin; stamens pilose below the middle; ovary tomentose; calyx short, tomentose; pedicels about 3 cm. long, pubescent. Fl.v. B.M.7495(c). Gt.35:t.1226(c). G.C.III.20:15;49:417. G.W.16:147(h). W.A.74,t(h). Cauc. Intr. 1886. Zone V.—Very distinct and handsome in bloom, but of rather loose habit.—There are crosses between this species and Catawbiense hybrids in cult.

A related species is **R. Ungérni** Trautv. Lvs. oblong, mucronate, with pale brown tomentum beneath: fls. pale rose to white, 5 cm. across, the lobes with flat margin; sepals longer, pointed; pedicels glandular-pubescent. B.M.8332(c). Gt.35:t.1226(c). Cauc. Intr. 1886. Zone V.

12. **R. caucásicum** Pall. Low dense shrub to 0.5 m. tall, with often procumbent stems; brts. with usually persistent bud-scales, slightly pubescent when young: lvs. narrow-elliptic to obovate-oblong, 5–10 cm. long, acute, cuneate at base, dark green above, with close brown tomentum beneath; petioles 6–8 mm. long: fls. 7–10; corolla funnelform-campanulate, 5 cm. across, with emarginate rounded lobes, pink to yellowish white, spotted greenish; stamens villous near base; ovary rufous-tomentose; calyx minute; pedicels loosely pubescent, about 3 cm. long. Fl.v. B.M.1145(c). Cauc. Intr. 1803. Zone V or IV? Rare in cult.—Var. **flàvidum** Reg. Fl. straw-yellow with greenish spots. Gt.16:t.516(c).—Var. **stramíneum** Hook. Fls. straw-yellow with fulvous spots. B.M.3422(c).

R. c. × *ponticum album* known as "Cunningham's White" is much used in Germany as a stock for hardy Rhododendrons.—*R. c.* × *arboreum* = **R. venústum** Sweet. Fls. rose-colored, paler in the centre, with dark blotch. S.B.II.3:t.285(c). Here also belong *R. Nobleanum* Lindl. Fls. bright rose. B.R.1820(c). Gn.77:30. and *R. pulcherrimum* Lindl. Similar but fls. paler.—The species has also entered into the so-called Catawbiense Hybrids. See No. 4.

13. **R. Metterníchii** Sieb. & Zucc. Shrub to 4 m.; young brts. tomentose at first: winter-buds woolly: lvs. narrow-oblong to oblanceolate, 5–12 cm. long, obtuse or short-acuminate, cuneate, rarely rounded at base, dark green above, beneath with gray to rufous scurfy rarely floccose tomentum; petiole 1–2 cm. long: fls. in loose clusters; corolla pale to deep rose-pink, campanulate, 5–7 cm. across, 5–7-lobed; calyx minute, pubescent; ovary brown-tomentose; stamens 10–14, pubescent below; style glabrous; pedicels slender, villous. Fl.IV–V. S.Z.1:t.9(c). N.T.1:49. (*R. japonicum* Schneid.) Japan. The typical form cult. in Japan with 7-lobed corolla (var. *heptamerum* Maxim.) is appar-

ently not in western gardens. The spontaneous form with smaller 5-lobed corolla is var. **pentâmerum** Maxim. Intr. 1870. Zone V.—Var. **angustifòlium** Makino. Brs. stiffly erect: lvs. narrower, to 16 cm. long, more revolute: fls. 5-merous, pale lilac-rose. N.T.1:51. M.I.1:t.35. (*R. stenophyllum* Makino.)

R. M. × *catawbiense* hybr. = **R. Waterèri** Wils. Lvs. with thin close dun-colored tomentum beneath, becoming glabrescent: fls. pale to deep rose-pink; ovary glabrescent; calyx with spreading rounded lobes. Orig. before 1909. Zone V.

14. **R. brachycârpum** D. Don. Shrub to 4 m.; young brts. gray-tomentose: lvs. elliptic to oblong-oblanceolate, 8–20 cm. long, obtuse and apiculate, cuneate to auriculate, dark green and reticulate above, with gray to dun-colored tomentum beneath; petiole stout, 1–3 cm. long, gray-tomentose: corolla broad-funnelform, about 5 cm. across, white or yellowish, striped and flushed pink, spotted greenish or brown; stamens unequal, pubescent near base; style glabrous; ovary brown-tomentose; calyx minute; pedicels slightly villous. Fl.vi. B.M.7881(c). N.K.8:t.14. G.F.1:292. G.C.III.77:233. Japan, Korea. Intr. 1861. Zone V.—Var. **rosaeflòrum** Miyoshi. Fls. pink.—Var. **lutéscens** Koidz. Lvs. glabrous beneath: fls. white to yellowish white, slightly or not spotted.

15. **R. Przewâlskii** Maxim. Compact shrub; young brts. yellow, glabrous: lvs. oval or obovate, 5–10 cm. long, acute or abruptly apiculate, rounded to subcordate at base, rarely broad-cuneate, dark green above, with close scurfy brown tomentum beneath; petiole yellow: corolla campanulate-funnelform, 3–4 cm. across, white to deep pink, spotted purple, lobes short and broad, emarginate; stamens glabrous or slightly pubescent at base; ovary and style glabrous; calyx minute, glabrous; pedicels glabrous, about 1 cm. long. Fl.vi–vii. (*R. kialense* Franch.) N. W. China. Intr. 1880. Zone V.

16. **R. campanulàtum** Don. Shrub to 5 m.; young brts. glabrous: lvs. elliptic to elliptic-oblong, 8–14 cm. long, usually obtuse and mucronate, broad-cuneate to subcordate, glabrous above, ferrugineous-tomentose beneath: fls. many; corolla broad-campanulate, 5 cm. across, rosy-purple, spotted purple; stamens glabrous or sometimes pubescent at base; ovary and style glabrous; calyx small, pubescent. Fl.v. B.M.3759(c). L.B.1944(c). H.U. 1:255. Gn.48:108;59:294. Sikkim, Nepal. Intr. 1825. Zone VII?—Var. **Wallíchii** Hook. Lvs. with loose caducous tomentum; petiole red: corolla not spotted, bright-colored. B.M.4928(c).

Sect. 2. Lepipherum Don.

17. **R. Keìskei** Miq. Shrub to 3 m. or sometimes procumbent; brts. slightly scaly: lvs. elliptic-oblong to lanceolate, 3–6 cm. long, acute to rounded at ends, mucronate, sometimes subauriculate at base, sparingly scaly above, densely so and pale beneath; petiole 4–6 mm. long, bristly and pubescent like base of midrib: fls. 3–6; corolla broad-campanulate, with short tube, sparingly scaly without, 4 cm. across, pale yellow; stamens exserted, slightly pilose near base; style glabrous, longer than stamens; calyx minute; pedicels densely scaly. Fl.v. B.M.8300(c). Millais, Rhodod.198. R.H.1917:348,t(c). N.T.1:58. Japan. Intr. 1905. Zone (V).

Related species are: **R. Hanceànum** Hemsl. Shrub to 1 m.; brts. glabrous: lvs. oblong-obovate to elliptic-lanceolate, 2–8 cm. long, acuminate, scaly above, minutely so beneath: fls. many; corolla campanulate-funnelform, 2 cm. across, yellow to white; stamens exserted, pubescent below the middle; sepals about 5 mm. long. K.B.1914:202,t. Millais, Rhodod.10.t. W. China. Intr. 1909. Zone VII?—**R. flàvidum** Franch. Shrub to 1 m.: lvs. oblong-ovate, 1–1.5 cm. long, dark green above, paler beneath, scaly on both sides: fls. 3–6, yellow, 2.5–3 cm. across; corolla with very short tube and spreading wavy lobes; stamens and style scarcely as long as corolla; sepals oblong, 5–6 mm. long, scaly; pedicels short. B.M.8326(c).

G.C.III.47:229. J.L.36:55. B.S.359. (*R. primulinum* Hemsl.) W. China. Intr. 1905. Zone VI.—**R. ambíguum** Hemsl. Lvs. elliptic to lanceolate, 4–7 cm. long, acute, subcordate or rounded at base, slightly scaly above, more densely so beneath: fls. pale yellow, spotted yellow-green, 5 cm. across, slightly scaly outside. B.M.8400(c). W. China. Intr. 1904. Zone VII?—Related to *R. yanthinum*, but fls. yellow

18. **R. Augustìni** Hemsl. Shrub to 6 m.; brts. scaly and pubescent: lvs. oblong-lanceolate to elliptic-oblong, 3–8 cm. long, acuminate or acute, broad-cuneate, dark green and minutely rugulose and puberulous above, scaly beneath and setose on midrib like petiole: fls. 3–4; corolla broad-campanulate, 3.5–5 cm. across, pale to purple pink, rarely nearly white, spotted yellow, tube much shorter than lobes; stamens as long or slightly shorter than corolla, pubescent toward the base; style longer, sepals short, ciliate; pedicels 1–2 cm. long. Fl.IV–V. B.M.8477(c). G.C.III.52:4. F.R.3:162. R.H.1909: 18. Millais, Rhodod.24,t(c);2:88,t(h). C. and W. China. Intr. 1899. Zone VI or VII.—Var. **violáscens** Wils. Fls. lavender- to purple-blue.—Var. **album** Wils. Fls white.

A related species is **R. villôsum** Hemsl. & Wils. Brts. scaly and setose: lvs. ovate-oblong, 5–8 cm. long, sparingly scaly and bristly above, more scaly but less bristly beneath and pubescent on midrib: fls. light to dark purple, 3.5–4 cm. across; corolla funnelform; stamens with tuft of hairs near base. W. China. Intr. 1904.

19. **R. Davidsoniànum** Rehd. & Wils. Brts. sparingly scaly: lvs. elliptic to oblong, rarely lanceolate, 2.5–6 cm. long, acute or short-acuminate, cuneate, sparingly scaly above, densely so and glaucous beneath, thinly coriaceous: fls. in few- to several-fld. terminal and axillary clusters; corolla funnelform-campanulate, 2.5–3 cm. across, pink, glabrous, lobes ovate, as long as tube; stamens slightly exserted, villous at base; style glabrous, longer than stamens; calyx minute. Fl.v. B.M.8605(c). R.H.1914:323, 324. Gn.78:316. W. China. Intr. 1908. Zone VI or VII?

19. **R. yunnanénse** Franch. Half-evergreen shrub to 2 m.; brts. slightly scaly: lvs. thin, narrow-elliptic or oblong-obovate to elliptic-lanceolate, 4–7.5 cm. long, acute at ends, ciliate, sparingly bristly above or sometimes glabrous, slightly scaly on both sides, thin: fl.-clusters terminal and often also axillary, 4–5-fld.; corolla broad-funnelform, 4–5 cm. across, white or slightly pinkish, with crimson spots; stamens exserted, hairy near base; style glabrous, longer than stamens; calyx minute. Fl.v. B.M.7614(c). G.C.III.54:396(h),397. Gn.88:168(h). M.G.1903:173. F.R.2:360. W. China. Intr. 1889. Zone VI.

A related species is **R. siderophýllum** Franch. Lvs. elliptic to elliptic-oblong, 3–6 cm. long, acute or acuminulate, broad-cuneate, slightly scaly above, paler and with yellow scales beneath, coriaceous: fls. 6–8, pale blush, spotted dark brown, 3–3.5 cm. across, lower lobes longer than upper ones; style as long, stamens shorter than corolla. W. China. Intr. 1904.

21. **R. yánthinum** Franch. Shrub to 3 m.; young brts. verruculose: lvs. elliptic-ovate, 3–6 cm. long, acute, rounded or sometimes broad-cuneate, rugulose and slightly scaly above, densely so and glaucescent beneath, aromatic; petiole 4–6 mm. long: fls. 4–8; corolla funnelform-campanulate, 4–5 cm. across, pale or rosy-purple, rarely white, spotted brown, glabrous outside; stamens as long as corolla, pilose at base; style longer, glabrous; sepals very short, often truncate. Fl.VI. (*R. Benthamianum* Hemsl., *R. atroviride* Dunn.) C. China. Intr. 1901. Zone VII.—Var. **album** Wils. Fls. white.—Var. **lepidánthum** Rehd. & Wils. Lvs. broader, corolla darker, scaly and pubescent outside.

Related species are: **R. bracteâtum** Rehd. & Wils. Shrub to 2 m.; brts. sparingly scaly: lvs. oblong, 2.5–4.5 cm. long, obtuse and mucronulate, passing toward base of brts. into linear or spatulate bracts; petiole 8–14 mm. long; fls. white, spotted red, about 3 cm. across; style slightly shorter than stamens; pedicels slender,

about 2 cm. long. B.M.9031(c). Millais, Rhod.2:94,t(c). W. China. Intr. 1910. Zone VII.—**R. concínnum** Hemsl. Lvs. narrow-elliptic, 3–6 cm. long, acute at ends, scaly above and densely so beneath; petiole 6–8 mm. long: fls. about 4 cm. across, purple; sepals short, rounded. B.M.8280(c),8620(c). G.C.III.53:341. S.L.336(h). (*R. coombense* Hemsl.) W. China. Intr. 1904. Zone VII?—**R. polýlepis** Franch. Lvs. elliptic-lanceolate to lanceolate, 3–7 cm. long, glabrous and rugulose above: fls. pale purple, spotted yellow, 4–5 cm. across; stamens longer than corolla, hairy at base; sepals short, rounded. B.M.8309(c). R.H.1914: 324,t(c). (*R. Harrovianum* Hemsl.) W. China. Intr. 1904. Zone VII?—**R. Seârsiae** Rehd. & Wils. Shrub to 2.5 m.; brts. scaly: lvs. lanceolate, 4–8 cm. long, acute at ends, glabrous above, bluish-glaucous and papillose beneath and with scattered brown scales: fls. 4–8, pale rose-purple to white, spotted green, 5 cm. across; sepals short, rounded, ciliate; pedicels 8–12 mm. long, scaly. B.M.8993(c). W. China. Intr. 1908. Zone VII or VI?—**R. moupinénse** Franch. Brts. hairy when young: lvs. elliptic to obovate, 2–3.5 cm. long, usually rounded and mucronate at apex, rounded or subcordate at base, dark green above, paler and minutely scaly beneath, ciliate toward the base at first: fls. usually 3, white or pink, with purple or yellow spots, pubescent near base, fragrant, about 5 cm. across; stamens shorter than corolla; anthers purple-brown; sepals ciliate. Kew Bull.1914:203,t. Gn.87:522;89:113(h). G.C.III.75:161(h). W. China. Intr. 1909. Zone VI or VII.—**R. glaùcum** Hook. f. Young brts., pedicels and calyx with reddish brown scurfy scales: lvs. elliptic to oblong, 2.5–7 cm. long, rounded at ends, dark dull green above, glaucous beneath, scaly on both sides: fls. 5–6, rosy-red, campanulate, 2–3 cm. across, slightly scaly outside; sepals ovate, longer than ovary; style and stamens slightly shorter than corolla; stigma large. B.M.4721(c). Sikkim and Bhutan. Intr. about 1850. Zone VII or VIII.

22. **R. carolinianum** Rehd. Upright shrub to 2 m., usually lower and compact: lvs. elliptic to narrow-elliptic, 5–8 cm. long, acutish or abruptly short-acuminate, broad-cuneate, glabrous above, ferrugineous scaly, often very densely so beneath, sometimes glaucescent; petiole 5–10 mm. long: fls. 5–10; before or with the young lvs.; corolla broad-funnelform, 3–4 cm. across, pale rosy purple, not or slightly spotted, tube gradually widened from the base, as long or shorter than lobes, glabrous or sparingly scaly outside; stamens shorter than corolla, villous at base; style glabrous, about 1.5 cm. long. Fl.v–vi. B.R.37(c). Add. 1:t.1(c). M.G.32:58(h). (*R. punctatum* Small, not Andr.) N. C. Cult. 1815. Zone V.—Var. **album** Rehd. Fls. white or nearly white. (*R. c.* var. *Margarettae* Ashe.) N. C. Intr. 1895.—Var. **foliàtum** Rehd. Shrub to 5 m., of looser habit: lvs. usually longer and narrower: fls. slightly smaller, spotted, more lepidote outside, appearing after the lvs. N. C. Intr. before 1880.

R. c. × *ferrugineum* = *R. laetevirens;* see under No. 24.

23. **R. mínus** Michx. Straggling shrub to 3 m.: lvs. narrow-elliptic to lanceolate, 4–10 cm. long, acute at ends, sometimes acuminate, glabrous above, scaly and often glaucous beneath: fls. 6–10; corolla funnelform, 2.5–3 cm. across, rosy-pink, spotted greenish, scaly outside, tube cylindric or nearly so, longer than the ovate lobes crinkled at margin; stamens about as long as corolla; style shorter, glabrous, 2–2.5 cm. long; sepals short. Fl.vi–vii. A.R.36(c). B.M.2285(c). (*R. punctatum* Andr., *R. Cuthberti* Small.) S. C. to Ga. and Ala. Intr. 1786. Zone V.

R. m. × *hirsutum* = *R. myrtifolium;* see under No. 24.—*R. m.* × *ferrugineum* = *R. arbutifolium;* see under No. 24.

24. × **R. myrtifòlium** Lodd. (*R. hirsutum* × *minus*). Compact shrub to 1.5 m.: lvs. elliptic, 2.5–6 cm. long, densely scaly beneath with brown scales, occasionally ciliate near base when young: corolla funnelform, about 2.5 cm. across, light rosy pink, with cylindric tube, longer than the spreading lobes; stamens little longer than tube; style shorter than stamens, about 3 times as long as ovary, sepals ovate, about half as long as ovary. Fl.vi. L.B.908(c). S.L.335(h). (*R. ovalifolium* Hort., *R. ovatum* Hort., not Hook.) Orig. before 1824.

Similar hybrids are: **R. arbutifòlium** Rehd. (*R. ferrugineum* × *minus*). Lvs. elliptic to narrow-elliptic, 3–6 cm. long, acute at ends, dark dull green above, scaly beneath with pale scales interspersed with darker ones: fls. rose-colored; calyx minute. (*R. daphnoides* Hort., *R. Hammondii* Hort.) Origin unknown.—**R. laetévirens** Rehd. (*R. carolinianum* × *ferrugineum*). Similar to the preceding: low wide-spreading shrub: lvs. somewhat narrower and longer, brighter green: fls. somewhat larger, about 3 cm. across. (*R. Wilsoni* Hort., not Nutt., *R. oleaefolium* Hort.)

25. **R. ferrugíneum** L. Dense shrub to 1 m.; young brts. covered with rusty scales: lvs. elliptic-oblong to oblong-lanceolate, 2–4 cm. long, acute at ends, lustrous dark green and sparingly scaly above, densely rusty-scaly beneath: fls. 6–12, pink to carmine; corolla funnelform, scaly outside, the tube about twice as long as the oblong spreading lobes, about 1.5 cm. across; style nearly twice as long as ovary; sepals very short; pedicels scaly, about 8 mm. long. Fl.VII–VIII. L.B.65(c). R.I.17:t.106,f.1,2(c). F.D.20:t.2029(c). Mts. of C. Eu. Intr. 1752. Zone V or IV.—Var. **album** Sweet. Fls. white. S.B.II. 3:t.258(c).—Var. **atrococcíneum** Millais. Fls. nearly scarlet.

R. f. × *hirsutum* = **R. halénse** Gremblich. Intermediate between the parents. (*R. intermedium* Tausch, not Wender., *R. hirsutiforme* Gremblich.) R.I.17:t. 1157(c). F.D.20:t.2030(c). Occurs occasionally with the parents. Cult. 1870.

A related species is **R. Kôtschyi** Simk. Smaller and lower: lvs. elliptic-oblong, 1–2 cm. long, obtusish, glabrous above: fls. rosy-pink; style as long or shorter than ovary. R.I.17:t.1157,f.2,3(c). Gn.56:159. (*R. myrtifolium* Schott & Kotschy, *R. ferrugineum* var. *m.* Schroet.) Carpathian mts. Intr. 1846. Zone V.

26. **R. hirsùtum** L. Shrub to 1 m.; young brts. scaly and hirsute: lvs. elliptic-oblong to obovate, 1–3 cm. long, obtuse to acutish, bright green and glabrous above, bright green and with scattered scales beneath, ciliate with long hairs: fls. similar to those of the preceding species; corolla slightly scaly outside; pedicels 1–2.5 cm. long, hirsute and scaly; sepals lanceolate, as long as ovary, hirsute. Fl.VI. L.B.479(c). B.M.1853(c). R.I.17:t.107,f.3–5(c). F.D.20:t.2031(c). Mts. of Eu. Intr. 1685. Zone V or IV?—Var. **album** Schinz & Kell. Fls. white. (Var. *albiflorum* Schroet.)—Var. **laciniàtum** Schroet. Lvs. deeply toothed or incised, at least near base: fls. white. Schroeter, Pflanzenleben Alp.113.—Handsome shrub, thriving in limestone soil.

27. **R. intricàtum** Franch. Shrub to 0.5 m.; young brts. scaly: lvs. broad-ovate to elliptic, 6–12 mm. long, dark green above, paler beneath, densely scaly on both sides: fls. 5–6: corolla broad-funnelform, with short rounded lobes, 1.5 cm. across, violet-purple; stamens pubescent at base, included in the tube; style shorter than stamens; sepals short, triangular. Fl.VI. B.M. 8163(c). G.C.III.41:262(h);63:143(h). Gn.78:29,t(c,h),190(h);87:512(h). S.L.334(h). (*R. nigro-punctatum* Hort., not Franch.) W. China. Intr. 1904. Zone VI?—Handsome low shrub, suited for the rock garden.

A related species is **R. lepidòtum** Wall. Lvs. oblong, 2–3.5 cm. long, scaly on both sides, hairy when young: fls. 1–3, long-stalked, dull purple, spotted, broad-campanulate, with short tube and spreading limb; stamens 8–10, little longer than tube; pedicels 2–3.5 cm. long. B.M.4657(c). Gn.15:182,t(c). G.C.II:22:297. Nepal, Sikkim. Cult. 1852. Zone VII?

28. **R. lappònicum** Wahlenb. Prostrate shrub, rarely to 0.5 cm. tall; young brts. very scaly: lvs. oblong, 6–20 mm. long, obtuse or abruptly pointed, dark green and rugose above, densely covered with brownish scales beneath; petiole 2–3 mm. long: fls. 3–6; corolla broad-campanulate, 1.5 cm. across, bright purple; stamens 5–8, as long as corolla, glabrous; sepals triangular, ciliate; pedicels 6–10 mm. long. Fl.VI–VII. B.M.3106(c). M.G.25:136(h). Mts. of N. Am., N. Eu., N. Asia. Intr. 1825. Zone I.—Attractive low plant adapted for cool half-shady places in the rockery.

29. **R. parvifòlium** Adams. Shrub to 1.5 cm., with erect and spreading

brs., scaly when young: lvs. narrow-elliptic to oblong or lanceolate, 5–20 mm. long, acute or obtuse and mucronate, cuneate, dark green and scaly above, densely covered beneath with pale or rusty scales: fls. 2–5, with persistent bud-scales, corolla broad-campanulate, deeply 5-lobed, 1.5–2 cm. across, rosy-purple; stamens 10, slightly shorter than corolla, villous near base; style longer than stamens; sepals ovate to oblong-ovate, 1–2 mm. long, scaly, often ciliate. Fl.IV–V. Gt.26:t.904(c). G.C.III.39:164;63:76. N.K.8:t.6,8. Gn.89:113(h). (*R. confertissimum* Nakai.) Siberia, Korea. Cult. 1877. Zone IV.

Related species are: **R. nitídulum** Rehd. & Wils. Brts. densely fuscous-scaly: lvs. oval to ovate, 7–12 mm. long, obtuse, densely scaly on both sides: fls. 1-2, violet-purple, rotate-funnelform, 2.5 cm. across; stamens 8–10, as long as corolla; sepals ovate to oblong-ovate, 2 mm. long. W. China. Intr. 1904. Zone VI?—Var. **nubígenum** Rehd. & Wils. Lvs. 4–8 mm. long: fls. lilac-purple, about 2 cm. broad; sepals oblong, nearly as long as ovary, usually colored. B.M.8529(c). (*R. nigropunctatum* Hutchins., not Franch.) W. China. Intr. 1903.—**R. Websteriànum** Rehd. & Wils. Densely branched upright shrub; brts. densely grayish scaly: lvs. oval or elliptic to elliptic-oblong, 6–15 mm. long, obtuse, usually cuneate, densely scaly on both sides, light yellowish gray or grayish white beneath: fls. 1–3, rosy-purple, 2.5–3 cm. across; stamens 10; sepals ovate, rounded, 2–5 mm. long. W. China. Intr. 1908. Zone VI?

30. **R. micrânthum** Turcz. Shrub to 2.5 cm.; brts. scaly and slightly pubescent at first: lvs. elliptic-oblong to oblanceolate, 2–3.5 cm. long, acute at ends, glabrous above, densely ferrugineous-scaly beneath; petiole 1–3 mm. long: fls. in many-fld. dense racemes 3–3.5 cm. across; corolla campanulate, white, with oval spreading lobes, as long as the tube, 1 cm. across, scaly outside; style longer than corolla, shorter than stamens; filaments glabrous; sepals ovate to lanceolate, often ciliate; pedicels scaly, 1–2 cm. long: fr. oblong, 5–8 mm. long. Fl.V–VI. B.M.8198(c). Gn.84:270. M.O.t.29. N.K.8:t.7. N. Korea to Manch. and N. China. Intr. 1900. Zone V.—Very distinct species, in habit and fls. resembling Ledum.

A related species is **R. longistỹlum** Rehd. & Wils. Shrub to 2 m.: lvs. oblong-lanceolate to oblanceolate, 2.5–5 cm. long, sparingly scaly beneath: fls. 10 or more, about 1.5 cm. across; filaments villous below the middle; style longer than stamens, 2.5–3 cm. long. R.H.1914:232, 233(h). M.O.303(h). W. China. Intr. 1908. Zone VI?

Sect. 3. Pogonanthum G. Don.

31. **R. Sargentiànum** Rehd. & Wils. Low shrub to 0.6 m., with upright or ascending brs.; brts. fuscous-tomentose: lvs. oval, 8–15 mm. long, obtuse and mucronulate, broad-cuneate, revolute, scaly above at first, soon glabrous and slightly rugulose, densely rusty-scaly beneath, aromatic: petiole 2–4 mm. long, scaly: fls. 6–12; corolla about 1 cm. across, white or pale yellow, scaly and sparingly pubescent outside; tube 6–7 mm. long; lobes suborbicular; stamens 5, glabrous, inclosed; style glabrous, shorter than stamens; sepals obovate, 3–4 mm. long, ciliate near apex. Fl.VI. W. China. Intr. 1904. Zone V or VI?

Related species are: **R. anthopôgon** D. Don. Lvs. oval or obovate, 2–3.5 cm. long, rusty-scaly beneath; fls. sulphur-yellow, about 1.5 cm. across; sepals oblong, ciliate. B.M.3947(c). E. Himal. Intr. 1820. Zone VI or VII?—**R. cephalánthum** Franch. Shrub to 1 m.: lvs. oval to oblong, 1.5–3 cm. long, obtuse, pale brown beneath: fls. in dense clusters, white, about 1 cm. across; stamens slightly pubescent at base; sepals ovate-oblong. Millais, Rhod.2:40,t(h). W. China. Intr. 1908. Zone VI?—**R. Adámsii** Rehd. Shrub to 0.5 m.: lvs. elliptic or elliptic-ovate, 1.5–2 cm. long, acute, rounded at base: fls. pink or white, glabrous outside; stamens puberulous at base; sepals ovate, 1–2.5 mm. long. Mém. Acad. Sci. St. Pétersb.2:t.14. (*R. fragrans* Maxim., not Paxt.) E. Siberia.—Apparently not yet intr., but probably the hardiest species of this group.

32. **R. Collettiànum** Aitch. Low shrub, occasionally to 3 m.; brts. fuscous-scaly: lvs. elliptic to elliptic-lanceolate, 4–7 cm. long, acute at ends, dull green above, fulvous-scaly beneath, aromatic: fls. white, in clusters 5–6 cm. across; corolla 2.5 cm. across; lobes oblong, upright-spreading; stamens 10; sepals oblong, ciliate. Fl.v–vi. B.M.7019(c). G.C.III.4:297. Afghan. Intr. 1879. Zone VI.

Sect. 4. Rhodorastrum Maxim.

33. **R. racemòsum** Franch. Upright shrub to 2 m.; brts. scaly: lvs. elliptic to oval or obovate, 1.5–3.5 cm. long, obtuse or acutish, rounded or broad-cuneate at base, glabrous above, glaucous and scaly beneath: fls. in numerous few-fld. clusters along the brts.; corolla pink, wide-campanulate, tube shorter than the oblong lobes; stamens 10, pubescent at base, longer than lobes. Fl.iv–v. B.M.7301(c). B.S.2:375. Gn.42:t.320(c);87:565(h). Gt.57:t.1577 (c). G.C.III.47:343. Millais, Rhod.2:30,t(h). W. China. Intr. 1889. Zone (V), VI.

A related species is **R. lutéscens** Franch. Shrub to 2 m.; brts. scaly: lvs. lanceolate or ovate-lanceolate, 3–8 cm. long, long-acuminate, cuneate, sparingly scaly above, more densely so and light green beneath: fls. pale yellow, rotate-funnelform, 2.5 cm. across; calyx minute, scaly. Millais, Rhod.2:244,t(c). R.H.1914:324,t(c). Gn.88:169. J.L.49:t.14. W. China. Intr. 1904. Zone VI or VII?

33. **R. daùricum** L. Dahurian R. Upright much-branched shrub to 2 m.; brts. scaly: lvs. deciduous or partly persistent till spring, elliptic or elliptic-ovate to oblong-ovate, 1–5 cm. long, obtuse, rounded or broad-cuneate at base, dark green and slightly scaly above, paler and densely scaly beneath, aromatic: fls. solitary, from axillary buds at end of brts.; corolla rotate-campanulate, 2.5–3.5 cm. across, rosy-purple, lobes longer than tube; stamens about as long as lobes, villous below the middle; style longer than stamens; calyx minute. Fl.iii–iv. A.R.1:t.4(c). B.M.636(c). L.B.605(c). G.C.II. 17:295;III.12:701;53:51. N.K.8:t.9. (*R. dahuricum* DC., *Azalea dahurica* K. Koch.) Altai Mts. to Korea, Manch. and N. Japan. Cult. 1780. Zone V or IV.—Var. **sempérvirens** Sims. Lvs. dark green, persistent or partly persistent: fls. darker, purple. B.M.1883(c). B.R.194(c). L.B.1584(c). R.H. 1908:198. Gt.53:267. (Var. *atrovirens* Ker.)—Var. **mucronulàtum** Maxim. Lvs. deciduous, elliptic to oblong, acute at ends, slightly crenulate, sparingly scaly: fls. pale rosy-purple; corolla 3–4 cm. across, divided to about the middle. M.D.1898:1,t(c). B.M.8304(c). G.F.9:65. G.C.III.74:41(h);75:115. S.L. 337(h). W.A.54,t(h, as *Azalea mucronulata*). (*R. m.* Turcz.) N. China, Manch., Korea, N. Japan. Intr. 1882.—Var. **ciliàtum** Wils. Similar to the preceding var., but lvs. and petioles ciliate and lvs. with a few appressed hairs above. N.K.8:t.11. (*R. mucronulatum* var. *c.* Nakai.) Korea, Japan. Intr. 1917.

R. d. × *ciliatum* Hook. f. = **R. praecox** Carr. Evergreen or half-evergreen shrub: lvs. elliptic, 2.5–5 cm. long, obtusish to acute, sparingly ciliate, lustrous dark green above, rusty-scaly beneath, sparingly ciliate: fls. few, bright rosy purple, broad-funnelform, about 4 cm. across; sepals ovate, ciliate. Fl.iii–iv. R.H.1868: 210,t(c). Gn.61:428(h). Gt.56:t.1567(c). G.C.III.12:771. Orig. about 1855.—Var. **rubrum** Wats. Fls. deeper colored. Gn.38:32,t(c).—Var. "Early gem." Lvs. more ciliate; fls. larger, pale lilac. G.C.II.11:335.

× Subgen. AZALEODENDRON Rodig. (*Eurhododendron* × *Anthodendron*, *Rhodazalea* Croux.).

R. azaleoìdes Dum.-Cours. (*R.* ?*nudiflorum* × *ponticum*). Lvs. rather large, acuminate, green beneath: fls. pale purple, not spotted, with wavy lobes. A.R.6:t. 379(c). (*R. ponticum* var. *deciduum* Andr.) Orig. before 1800.—Here belongs also: *R. gemmiferum* Bean. Lvs. broader, obtusish or acutish, pubescent beneath: fls. rose-purple, 3 cm. across. Orig. unknown. Zone (V).

R. hýbridum Ker. (*R. viscosum* × *maximum*). Lvs. oblong, 5–10 cm. long, acute at ends, glaucous beneath: fls. whitish, tinged with pink or purple, upper lobe spotted yellow, fragrant, 3 cm. across. B.R.t.195(c). (*R. azaleoides* Bean, not Dum.-Cours.) Orig. before 1850.

R. fragrans Paxt. (*R. catawbiense* × *viscosum*). Lvs. shorter and broader: fls. pale pinkish, fragrant. P.M.10:147,t(c). Orig. about 1820.

R. norbitonénse Smith (*R. molle* × [*maximum* × *ponticum*]). A hybrid with yellow fls., originated about 1830, of which the two following vars. are occasionally cult.: Var. **broughtoniànum** Rehd. Young brts. pubescent: lvs. persistent, oblong to oblong-obovate, 5–12 cm. long, pale green beneath, finely pubescent on both sides: fls. 8–16 in dense clusters, primrose-yellow, spotted reddish brown, about 6 cm. across; sepals oblong. G.C.III.51:53. B.S.2:345. Millais, Rhodod.184,t(h). (*R. broughtonii aureum* W. Wats.)—Var. **aùreum** Rehd. Similar to the preceding, but lvs. glaucous beneath: fls. paler; pedicels longer; sepals narrower. P.M.9:79,t(c). F.R.2:152,t(c). F.S.1:45.t(c). (*R. Smithii aureum* Paxt.)

R. azaleodéndron Vilm. & Bois. (*R. japonicum* × *Eurhododendron hybrids*). Evergreen: fls. white to rosy-red or rose-lilac, conspicuously spotted. G.C.III.13: 663. R.B.19:177,t(c). R.H.1893:369.

Subgen. II. AZALEASTRUM Maxim.

34. **R. albiflòrum** Hook. Deciduous shrub to 2 m.; young brts. hairy and glandular: lvs. elliptic-oblong to oblong, 2.5–6 cm. long, acute at ends, appressed-pilose above and on the midrib beneath, slightly ciliate, pale green; petiole strigose: fls. nodding on short glandular-pubescent pedicels, white; corolla rotate-campanulate, 2 cm. across, with ovate lobes; stamens 10, pubescent at base; sepals oval to obovate-oblong, 7–12 mm. long, glandular-ciliate. Fl.VI–VII. B.M.3670(c). (*Azalea albiflora* Ktze.) B. C. and Alb. to Ore. and Colo. Intr. before 1837, but rare in cult. and not thriving well in the East.

Related species are: **R. semibarbàtum** Maxim. Shrub to 2 m.: lvs. oval to ovate-lanceolate, 1–5 cm. long, obtuse or emarginate, crenulate-serrulate and often ciliate, pubescent on midrib: fls. white, spotted red, subrotate, 2 cm. across; calyx minute: stamens 5. Gt.24:t.666(c). Japan. Intr. about 1860. Zone VI? —**R. ovàtum** Planch. Evergreen; young brts. pubescent: lvs. ovate to elliptic-ovate, 2–6 cm. long, acute, rounded to broad-cuneate at base, lustrous dark green above, glabrous: fls. solitary, pale purple to pink or nearly white, spotted, 2.5–3 cm. across; stamens 5; sepals oblong, glandular-ciliate. Fl.V–VI. B.M.5064(c). J.L.1847:126. C. China. Intr. 1844. Zone VII?

Subgen. III. ANTHODENDRON Endl.
Sect. 1. Tsutsutsi G. Don.

36. **R. Tschonóskii** Maxim. Deciduous densely branched shrub, to 1.5, rarely 2.5 m. tall, sometimes low and depressed: lvs. crowded at ends of brts., elliptic or oblong to ovate-lanceolate or lanceolate-oblong, 8–35 mm. long, acute at ends, pale green beneath, appressed-pilose on both sides, with 1–3 prominent veins: fls. 2–6, short-stalked; corolla funnelform, about 1 cm. across, with cylindric tube, villous inside, sometimes with 4 lobes (f. *tetramerum* Makino); stamens exserted, pilose below the middle; calyx setose: fr. ovoid. Fl.VI. N.T.1:84. N.K.8:t.7. S.H.2:f.332l-o. (*Azalea T.* Ktze.) Japan, Korea. Intr. 1878. Zone V.—Fls. insignificant; lvs. changing to orange-red and crimson in autumn.

37. **R. índicum** L. Evergreen or half-evergreen, dense and low shrub, rarely to 2 m. tall: lvs. short-petioled, elliptic-lanceolate to lanceolate or oblanceolate, 2–3.5 cm. long, acute at ends, dark green and somewhat lustrous above, glaucescent beneath, remotely crenulate-serrulate, ciliolate, sparingly strigose on both sides: fls. 1–2; corolla broad-funnelform, bright red to scarlet, 5–7 cm. across; stamens 5, about as long as corolla; style longer. Fl.VI. B.R.1700(c). S.B.II.3:t.261(c). (*R. macranthum* G. Don, *R. i.* var. *macranthum* Maxim., *Azalea indica* L.) Japan. Cult. 1680. Zone (V).—Var. **bal-**

saminaeflòrum Nichols. Dwarf form: lvs. 1–2.5 cm. long: fls. double, salmon-red. R.H.1882:432,t(c). Gn.18:254,t(c). F.M.19:t.418(c). (Var. *rosaeflorum* Rehd., *Azalea Rollisonii* Moore.) Intr. about 1877. Zone (VI).—Var. **crispiflòrum** Schneid. Lvs. thicker: lobes of corolla with wavy margin. B.M.4726(c). F.S.9:79,t(c). Intr. about 1850. Zone VI or VII?

38. **R. obtûsum** Planch. Much-branched half-evergreen shrub, to 1 m., sometimes prostrate: lvs. elliptic to elliptic-lanceolate, 1–2.5 cm. long, acute at ends, or obovate and obtuse at ends of shoots and more coriaceous and partly persistent, dark green and lustrous above, strigose on midrib beneath: fls. 2–3, orange-red to bright red; corolla funnelform, 2.5–3.5 cm. across; stamens 5; anthers yellow; sepals small, ovate, ciliate. Fl.IV–V. B.R.32:37(c). (*Azalea obtusa* Lindl.) Japan; cult. Intr. about 1844. Zone VI or VII.—Var. **album** Schneid. Fls. white. G.F.9:395. (*Azalea ramentacea* Lindl.) Intr. 1846.—Var. **japônicum** Wils. Lvs. elliptic to elliptic-ovate, 1–2 cm. long, acute, bright green; summer-lvs. oblanceolate to obovate, strigose on both sides: fls. 2–5; anthers yellow-brown to purple. N.T.1:87. M.I.2:t.132(c). (*R. indicum* var. *j.* Mak., *R. Kaempferi* var. *japonicum* Rehd., *R. kiusianum* Mak.) Japan. The spontaneous form of the species.—Var. **amoênum** Rehd. Lvs. elliptic to elliptic-obovate, 1–2 cm. long; fl. rich magenta, double (hose-in-hose) about 2 cm. across; anthers usually purple. B.M.4728(c). R.H. 1854:241,t(c). F.S.9:t.885(c). (*Azalea a.* Lindl). Intr. 1850. Zone (V).—Var. **arnoldiànum** Rehd. (var. *amoenum* × var. *Kaempferi*). Low shrub: lvs. 1.5–4 cm. long: fls. rosy mauve to red, 3–3.5 cm. across: similar to var. *japonicum* but lvs. larger, thinner and lighter green and persistent summer lvs. less numerous. H.B.3:283(h). Orig. 1910. Zone V.—Var. **Kaèmpferi** Wils. Shrub to 3 m.: lvs. elliptic or rhombic to ovate-lanceolate, 2–6 cm. long, acute, summer lvs. elliptic to obovate, acute or obtusish, strigose on both sides and with rufous hairs on midrib and petiole, bright green, rather thin, persistent summer lvs. none or very few: fls. 2–4, red or orange-red to pink; sepals oval to oblong-ovate, 2–8 mm. long, obtuse, ciliate; corolla 3–5 cm. across; anthers yellow. S.I.2:t.61(c). S.T.2:t.113. M.G.17:417(h). S.L.344(h). (*R. K.* Planch., *R. indicum* var. *K.* Maxim., *Azalea K.* André.) Japan. Intr. 1892. Zone V.—A very handsome shrub flowering profusely before or with the lvs. which turn orange and scarlet in autumn.

R. o. × *Simsii* = **R. Sânderi** Wils. Intermediate between the parents: shoot-lvs. elliptic-ovate to ovate-oblong: summer lvs. mostly obovate. Orig. about 1890. Zone VI or VII?

A related species is **R. serpyllifòlium** Miq. Low much-branched shrub: lvs. mostly crowded at ends, subsessile, narrow-elliptic to obovate, 4–12 mm. long, obtuse to acutish, strigose above and on midrib beneath, ciliate: fls. solitary, subsessile, rose-red, 1.5–2 cm. across; stamens and style much exserted. Fl.IV. B.M. 7503(c). N.T.1:82. (*Azalea serpyllifolia* Gray.) Japan. Intr. about 1880. Zone VI or VII.

39. **R. Símsii** Planch. Evergreen or half-evergreen shrub, to 3 m.: lvs. elliptic-ovate to lanceolate, 2–5 cm. long, acute at ends, sparingly strigose and dull green above, more densely strigose beneath at least on veins, summer lvs. obovate to oblanceolate and more persistent: fls. 2–6; corolla broad-funnelform, 3.5–5 cm. across, rose-red to bright or dark red; stamens 10, sometimes 7–9, as long as corolla, shorter than the style; anthers purple; sepals minute or to 5 mm. long and ovate to lanceolate, strigose and ciliate. Fl.V–VI. B.M. 1480(c). L.B.275(c). S.B.II.2:t.128(c). (*R. indicum* var. *S.* Maxim., *R. indicum* var. *ignescens* Sweet, *Azalea indica* Sims, not L.) China, Formosa. Intr. 1808. Zone VIII? Many garden forms are in cult.

40. **R. yedoénse** Maxim. Deciduous shrub or half-evergreen, low; brts.

strigose: lvs. narrow-elliptic to lanceolate, 3–7 cm. long, acute at ends, often obscurely crenulate, dark green above, with impressed veins and sparingly strigose, paler beneath and more densely strigose or only so on veins: fls. 1–3, the inner bud-scales viscid; corolla double, pale rosy lilac, spotted dark purple; sepals oval, 1–1.5 cm. long, strigose and ciliate. Fl.v. Gt.35:t.1233a-b(c). R.H.1908:405,t,f.2(c). G.W.16:163,t(c). N.T.1:108. (*R. poukhanense* var. *yodogawa* Rehd., *Azalea yodogava* Grignan.) Cult. in Korea and Japan. Intr. 1884. Zone V.—Var. **poukhanénse** Nakai. Compact low shrub, but in shady places to 2 m.: lvs. elliptic or ovate-lanceolate to lanceolate or oblanceolate, 3–8 cm. long: fls. fragrant: corolla pale lilac-purple spotted purple-brown, about 5 cm. across; anthers purple; sepals ovate-oblong, 5–10 mm. long, obtuse, strigose. M.I.2:t.133. N.K.8:t.18. Gn.M.29:223(h). M.G.32:58(h). (*R. p.* Lév., *R. coreanum* Rehd., *Azalea poukhanensis* Olmsted, Coville & Kelsey.) Korea. Intr. 1905. Zone V.—Very handsome shrub flowering freely when quite small.

Related species are: **R. scábrum** G. Don. Shrub to 2 m.: lvs. persistent, lanceolate to elliptic-lanceolate, 4–10 cm. long, acute or obtuse and mucronulate, obscurely crenulate, strigose on veins beneath, subcoriaceous: fls. rose-red to scarlet, about 6 cm. across; sepals oval, glandular-ciliate. B.M.8478(c). G.C.III.49:342. N.T.1:117. (*R. sublanceolatum* Miq.) Japan. Cult. 1911. Zone VII or VIII?—**R. púlchrum** Sweet. Similar to *R. scabrum* and possibly a hybrid with *R. mucronatum*. Lvs. entire, thinner: fls. rosy-purple, 6–7 cm. across; sepals lanceolate. S.B.II.2:t.117(c). (*R. phoeniceum* var. *Smithii* Wils.) Cult. in China. Intr. before 1830. Zone VII or VIII?—Var. **phoeníceum** Rehd. Fls. rose-purple to magenta. B.M.2667(c). S.B.II.3:t.284(c). (*R. p.* G. Don, *R. puniceum* Planch., *R. ledifolium* var. *p.* DC.) Cult. in China. Intr. 1824.—Var. **calýcinum** Rehd. Fls. large, bright rose-purple; sepals lanceolate, usually acuminate. P.F.2:t.17(c). M.I.4:t.217. (*R. c.* Planch., *R. ledifolium* var. *purpureum* Maxim., *R. phoeniceum* var. *c.* Wils.) Cult. in Japan. Cult. 1851.

41. **R. mucronàtum** G. Don. Evergreen or half-evergreen much-branched shrub to 2 m., rarely to 3 m.; brts., petioles and pedicels densely clothed with spreading gray-brown occasionally glandular hairs and strigose: lvs. elliptic to elliptic-lanceolate, 3–6 cm. long, acute or obtusish, on both sides with appressed gray to rufous hairs, summer lvs. smaller, oblong-lanceolate, obtuse, more coriaceous: fls. 1–3, fragrant: corolla white, broad-funnelform, about 5 cm. across; stamens 10, sometimes 8 or 9; sepals lanceolate, erose-serrate, about 1 cm. long, glandular-pubescent. Fl.v. B.M.2901(c). B.R.811(c). L.B.1253(c). Gn.33:321,t(c). G.C.III.33:373. G.W.15:650. S.L.345(h). (*R. ledifolium* G. Don, *R. ledifolium* var. *leucanthum* DC., *R. rosmarinifolium* Dipp., not Vidal, *R. ledifolium* var. *album* Rehd., *Azalea mucronata* Bl.) Japan. Intr. 1819. Zone (V).—Var. **Noordtiánum** Wils. Lvs. elliptic: fls. larger, white. R.B.30:133,t(c). Gn.59:310. M.G.20:73. (*Azalea ledifolia* var. *Noordtiana* Wittm., *A. japonica alba grandiflora* Pynaert.) Japan. Cult. 1905.—Var. **narcissiflòrum** Wils. Fls. double, white. Florist,1880:89. (*R. n.* Planch.) Intr. about 1850.—Var. **plènum** Wils. Fls. rose-purple, double or semi-double. B.M.2509(c). Gt.35:t.1233c-d(c). Intr. 1819.—Var. **amethýstinum** Wils. Fls. flushed pale lilac-purple, spotted faintly pink.—Var. **ripénse** Wils. Fls. rose-purple. M.I.2:t.120. N.T.1:109. (*R. r.* Makino.) Japan. Intr. before 1910.

R. m. × *scabrum* = *R. pulchrum;* see under No. 40.

42. **R. linearifòlium** Sieb. & Zucc. This is a garden form of the following and differs in its linear or linear-lanceolate lvs. and in the pink corolla being deeply divided into linear-lanceolate segments. B.M.5769(c). S.H.2:f.330g-k, 331f. (*R. Burmanii* f. *l.* Nakai, *Azalea linearifolia* Hook. f.) Cult. in Japan. Intr. before 1867. Zone VII.—Var. **macrosépalum** Mak. Deciduous or

nearly deciduous shrub to 1 m., rarely taller; brts. villous and sparingly strigose: lvs. elliptic-ovate to ovate-lanceolate, 2–5 cm. long, short-acuminate to acute, sparingly glandular-hairy above, more densely so beneath, summer-lvs. oblanceolate and obtuse: fls. 2–10, fragrant: corolla rose-lilac to rose-purple, spotted, 3–5 cm. across; stamens 5, sometimes 6–10 (f. *decandrum* Wils.) shorter than corolla; style longer; sepals lanceolate, 1–3 cm. long, glandular-pubescent. Gt.19:t.662(c). D.L.1:420. N.T.1:116. (*R. m.* Maxim., *R. Burmanii* var. *m.* Nakai.) Japan. Intr. 1863. Zone VI or VII.—Var. **dianthiflôrum** Wils. A form of the preceding var. with double fls. R.H.1891: 60,t(c). (*R. d.* Millais.) Intr. 1889.

Sect. 2. Sciadorhodion Rehd. & Wils.

43. **R. Weyríchii** Maxim. Deciduous shrub to 5 m.; young brts. ferrugineous-pubescent, becoming glabrous and purple: lvs. 2–3 at end of brts., broad-ovate or rounded-ovate to rhombic, 3.5–8 cm. long, acutish or obtuse and mucronulate, broad-cuneate or rounded at base, at first rufous-pubescent on both sides, soon glabrous, lustrous dark green above; petioles 5–10 mm. long, rufous-pubescent and setose: fls. 2–4, with the lvs.; corolla red, funnelform, 3.5–6 cm. across, stamens 6–10, shorter than corolla; sepals minute; pedicels, calyx and ovary densely rufous-pubescent: fr. cylindric to oblong-ovoid, 1.5–2 cm. long, pubescent. Fl.v. Mém. Acad. Sci. St. Pétersb. VII.16,9:t. 2,f.1–6. N.K.8:t.16. N.T.1:76. (*Azalea W.* Ktze.) Japan, Korea. Intr. 1914. Zone VI.—Handsome shrub with red fls. in spring; lvs. turning vinous-purple in autumn.

44. **R. reticulàtum** D. Don. Deciduous much-branched shrub to 8 m.; young brts. pubescent, soon glabrous, yellow-brown; winter-buds acute, pubescent: lvs. 2 or 3 at end of brts., broad-ovate or ovate to rhombic, 3–6 cm. long, acute and mucronate, 3–6 cm. long, usually broad-cuneate, fulvous pubescent and strigose at first, at maturity dark green and sparingly strigose or glabrous above, pubescent on the veins beneath and sparingly strigose or nearly glabrous, pale or glaucescent, reticulate; petioles 4–8 mm. long, pubescent and strigose: fls. 1–2, rarely to 4, before the lvs.; corolla rotate-campanulate, slightly 2-lipped, rose-purple to magenta, not or slightly spotted; stamens usually 10, declinate, the longer ones as long, the shorter ones half as long as the corolla; anthers purple; style glabrous or glandular; ovary strigose or villous; pedicels and the minute calyx pubescent: fr. cylindric, curved, 1–1.5 cm. long. Fl.iv–v. Gt.17:225,t(c). B.M.6972(c). B.C.III. 20:38. N.T.1:71,74. Gn.72:267(h). (*R. rhombicum* Miq., *R. dilatatum* Miq., *Azalea reticulata* K. Koch.) Japan. Intr. 1865. Zone V.—Var. **pentândrum** Wils. Lvs. usually quite glabrous at maturity: stamens 5; ovary glandular; style glabrous. B.M.7681(c). S.I.2:t.61(c). (*R. dilatatum* Maxim., not Miq.) Japan. Cult. 1880.—The generally cult. form with 10 stamens, glandular style and villous ovary has been distinguished as *R. wadanum* Mak.—Very handsome shrub with rose-purple fls. in spring before the lvs.

45. **R. quinquefòlium** Biss. & Moore. Deciduous shrub or small tree to 8 m.; young brts. glabrous, lustrous brown, old stems gray-brown, scaly; winter-buds acute, glabrous: lvs. 4–5 at end of brts., broad-elliptic to obovate, 3–5 cm. long, obtuse or acutish, mucronate, cuneate, ciliate and often red on margin, villous beneath at least on midrib; petiole very short, villous: fls. 1–3, with the lvs.; corolla white, spotted green, rotate-campanulate, about 4 cm. across; stamens 10, unequal; filaments greenish, villous at base; style longer than stamens, glabrous; ovary glabrous; sepals deltoid to lanceolate,

glandular-ciliate; pedicels slender, glandular-pubescent: fr. cylindric, 1–1.5 cm. long. Fl.v. Millais, Rhod.2:218,t. N.T.1:80. M.I.1:t.30. Japan. Intr. 1896. Zone VI.

46. **R. Schlippenbâchii** Maxim. Deciduous shrub to 5 m.; young brts. glandular-pubescent, glabrous the 2d year: lvs. usually 5 at ends of brts., short-petioled, obovate or broad-obovate, 5–10 cm. long, truncate or rounded to emarginate at apex, mucronate, cuneate, slightly undulate, sparingly pubescent when young, later glabrous except on veins beneath, dark green above, pale beneath: fls. 3–6, fragrant, with the lvs.; corolla pale to rosy pink, rotate-funnelform, 6–8 cm. across, spotted red-brown; stamens 10, unequal, the longest as long as corolla; style longer; sepals ovate, 5 mm. long; pedicels glandular-pubescent: fr. oblong-ovoid, 1.5 cm. long, glandular. Fl.v. B.M.7373(c). Gn.46:80,t(c). G.C.III.19:561;55:9,t. W.A.58,t(h). (*Azalea S.* Ktze.) Korea, Manch., Japan. Intr. 1893. Zone V.—Beautiful shrub with large pink fls. in spring; the lvs. changing to yellow, orange and crimson in autumn.

Sect. 3. Rhodora G. Don.

47. **R. Albréchti** Maxim. Shrub to 1.5 m.; young brts. glandular-pubescent, becoming glabrous and purple-brown: lvs. about 5 at end of brts., obovate to oblanceolate, 4–12 cm. long, acute or acutish, mucronulate, ciliate-serrulate, sparingly appressed-pilose above, gray-pubescent beneath, membranous; petiole short, winged: fls. with the lvs., 3–5; corolla rotate-campanulate, about 5 cm. across, red-purple; stamens 10, unequal, the longest as long as the corolla, style longer; sepals small, ciliate, purple; pedicels 1–2 cm. long, glandular-pubescent: fr. conic-ovoid, 1–1.2 cm. long, glandular-pubescent. Fl.v–vi. N.T.1:67. S.H.2:f.325m-n,327e. Mém. Acad. Sci. St. Pétersb. VII.16,9:t.2,f.14–20. (*Azalea A.* Ktze.) Japan. Intr. 1892. Zone V.—Handsome shrub similar to *R. Schlippenbachii*, but less showy; the lvs. turn yellow in autumn.

48. **R. pentaphýllum** Maxim. Shrub to 8 m.; young brts. sparingly pilose, soon glabrous; winter-buds acute, glabrous, purple-brown: lvs. usually 5 at end of brts. elliptic to elliptic-lanceolate 3–6 cm. long, acute and mucronulate, cuneate, ciliolate-serrulate, villous on midrib above and beneath, otherwise glabrous, chartaceous, reticulate; petiole 3–8 mm. long, usually pilose and glandular: fls. 1–2, before or with the lvs.; corolla rotate-campanulate, 4–5 cm. across, rose-pink, unspotted; stamens 10, unequal, villous at base, shorter than corolla, style longer, glabrous; sepals triangular to deltoid, 1–5 mm. long, glabrous; pedicels 1–1.5 cm. long, glandular-pubescent to glabrous: fr. spindle-shaped, about 1.5 cm. long, verruculose. Fl.iv–v. N.T.1:70. M.I.3:t.168(c). (*R. quinquefolium* var. *roseum* Rehd.) Japan. Intr. 1914. Zone (V) VI.—Handsome shrub with soft-pink fls. in spring and orange to crimson lvs. in autumn.

Another Japanese species of this group is **R. nippónicum** Makino. Shrub to 2 m.; brts. glandular-pubescent: lvs. scattered, sessile, obovate-oblong, 6–18 cm. long, rounded or truncate at apex, appressed-pilose on both sides: fls. 6–15, with or after the lvs.; corolla tubular-campanulate, 1.5–2 cm. long, white, with short slightly spreading lobes; stamens and style included; the slender pedicels and small calyx glandular-pubescent. N.T.1:64. M.I.1:t.5. Japan. Intr. 1914. Zone V or VI?—Less handsome than other related species; fls. hidden by the foliage which turns orange to crimson in autumn.

49. **R. Vaseÿi** Gray. Shrub to 5 m.; brts. puberulous and sparingly pilose at first, soon glabrous, light red-brown, older brs. with grayish brown flaky bark; winter-buds broad-ovoid, obtuse, with 7–10 ciliolate scales: lvs. scattered, elliptic to elliptic-oblong, 5–12 cm. long, acuminate, cuneate, with

ciliate and usually slightly undulate margin, glabrous above except the midrib, green and glabrous beneath or sparingly pilose on midrib; petiole slender, 3–7 mm. long, glabrous or sparingly pilose: fls. 5–8, before the lvs.; corolla rotate-campanulate, 2-lipped, 2.5–3 cm. long, tube about 5 mm. long, the upper lip less deeply divided; light rose, spotted orange; stamens 5–7, usually 7, the longer exceeding the corolla, glabrous; style longer than stamens, glabrous or with few glands near base; sepals short, rounded, glandular-ciliate; pedicels 5–15 mm. long, stipitate-glandular. Fl.IV–V. B.M.8081(c). Mn.7: 121,t(c). Gn.54:282,t(c);56:119(h). G.F.1:377. M.G.14:332, 333(h). S.L. 347(h). (*Azalea V.* Rehd., *Biltia V.* Small.) N. C. Intr. about 1880. Zone V.—Var. **album** Nichols. Fls. white. Intr. 1891.—Very handsome species with profuse fls. before the lvs.

50. **R. canadénse** Torr. RHODORA. Much-branched shrub to 1 m.; brts. puberulous when young, yellowish red or pinkish, often bloomy; winter-buds with acute to acuminate puberulous and ciliolate scales: lvs. petioled, elliptic to oblong, 2–4.5, rarely to 6 cm. long, obtuse or acutish, cuneate, with ciliate and revolute margin, dull bluish green above, thinly grayish tomentulose beneath, usually sparingly glandular and pilose on midrib: fls. 3–7, before the lvs.; corolla 2-lipped, 1.5–2 cm. long, the lower lip divided to or nearly to the base into 2 narrow-oblong lobes, the upper lip with 3 short ovate lobes, rose-purple; stamens 10, about as long as corolla, pubescent near base; style slightly longer, glabrous or nearly so; sepals very short, unequal, setose-ciliate; pedicels 3–7 mm. long, puberulous, usually sparingly glandular: fr. ovoid-oblong, 1–1.5 cm. long, puberulous and setose. Fl.IV–V. B.M.474(c). Em.2:441,t(c). G.O.t.14(c). C.L.11:496. M.G.17:287(h). S.L.346(h). (*R. Rhodora* Gmel., *Rhodora canadensis* L.) Nfdl. and Lab. to C. N. Y. and Pa. Intr. before 1756. Zone II?—Var. **albiflòrum** Rehd. Fls. white. (*R. c.* f. *album* Voss.) Cult. 1894.—Handsome shrub valued for its early fls.

R. c. × *japonicum* = *R. Fraseri;* see under No. 51.

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51. **R. japónicum** Suringar. Shrub with stout erect brs. to 2 m.; winter-buds ovoid, acute or acutish, slightly puberulous; brts. glabrous, sometimes setose: lvs. obovate to obovate-oblong, 4–10 cm. long, obtuse and mucronulate, cuneate, ciliate, appressed-setose above and on the veins beneath: fls. 6–12, before the lvs.; corolla campanulate-funnelform, 5–6 cm. across, orange-red or salmon-red to brick-red; stamens shorter than corolla, pilose below the middle, anthers brown; sepals small, ovate, setose; pedicels usually setose. Fl.IV–V. B.M.5905(c). Gt.16:289,t(c);57:516,t(c). F.S.19:t.2034–5(c). S.I. 2:t.62. Gn.46:546;59:503. C.L.11:495. Gng.4:279. (*R. molle* Sieb. & Zucc., not G. Don, *R. molle* var. *glabrior* Miq., *Azalea japonica* Gray, *R. glabrius* Nakai.) Japan. Intr. 1861. Zone V.—Var. **aùreum** Wils. Fls. yellow.—Vigorous shrub with very handsome conspicuous fls. in spring.

R. j. × *molle* = **R. Kosteriânum** Schneid. Many garden forms ranging in color from white to red: lvs. only slightly pubescent beneath. Here belongs "Anthony Koster" and "Miss Louisa Hunnewell." R.B.17:121,t(c);20:277,t(c). G.C.III. 13:513.—*R. j.* × *canadense* = **R. Fràseri** W. Wats. Young brts. and winter-buds finely pubescent: lvs. elliptic-oblong to oblong, 4–6 cm. long, acute at ends, pubescent on both sides: fls. rosy-lilac, spotted, 2-lipped, with very short tube and deeply divided lower lip, 3.5–4 cm. across. Orig. 1912.

52. **R. mólle** G. Don. Shrub to 1.5 m.; young brts. pubescent and often setose; winter-buds grayish pubescent: lvs. oblong to oblong-lanceolate or oblanceolate, 6–15 cm. long, obtuse and mucronulate, cuneate, ciliate and often revolute, pubescent above at least when young, grayish soft-pubescent

beneath: fls. many; corolla campanulate-funnelform, about 5–6 cm. across, finely pubescent outside, golden-yellow, spotted greenish: stamens as long or longer than corolla; sepals short, ciliate; pedicels puberulous, not or slightly setose. Fl.IV–V. S.B.3:290(c). L.B.885(c). B.R.1253(c). S.H.2:f.328g-h; 329a-b. (*R. sinense* Sweet, *Azalea mollis* Bl.) China. Intr. 1823. Zone VI. (V).—Handsome shrub with conspicuous yellow fls.

R. m. × *occidentale* = **R. álbicans** Waterer. Lvs. pubescent beneath: fls. large, usually light-colored, white to light pink or rose, with an orange blotch divided by lighter veins; stamens not or slightly exserted. F.P.1883:177,t(c). Gn.29:550,t(c), partly. Orig. before 1880. Here belongs "Graciosa" and "Exquisite."—*R. m.* × *japonicum* = *R. Kosterianum;* see under No. 51.—*R. m.* × *gandavense* = *R. mixtum;* see under No. 53.—*R. m.* × *viscosum* = *R. viscosepalum;* see under No. 60.—*R. m.* × (*maximum* × *ponticum*) = *R. norbitonense;* see p. 692.

53. **R. lûteum** Sweet. Shrub to 4 m.; brts. glandular-pubescent when young; winter-buds minutely pubescent, viscid: lvs. oblong to oblong-lanceolate or oblong-oblanceolate, acute or obtuse and mucronate, ciliate-serrulate, hairy on both sides, villous and glandular when young: fls. many, very fragrant; corolla yellow, funnelform, about 5 cm. across, with narrow-cylindrical tube 1.5–2 cm. long; stamens much exserted, shorter than style; ovary glandular; sepals ovate to oblong, glandular-ciliate; pedicels, calyx and corolla outside glandular: fr. cylindric-oblong, 2–2.5 cm. long, glabrescent. Fl.V. B.M.433(c). S.O.3:t.169(c). R.I.17:t.108(c). Millais, Rhodod. 12:t(h);165, t(c). Gn.29:550. (*R. flavum* G. Don, *Azalea pontica* L.) Asia Minor, Cauc., E. Eu. Intr. 1792. Zone (V).—Var. **macránthum** Wils. Fls. to 6.5 cm. across. —Handsome shrub with very fragrant yellow fls.

R. l. × *Mortieri* = **R. gandavénse** Rehd. Here belong the so-called Ghent Azaleas representing hybrids of the preceding species with *R. calendulaceum* and *R. nudiflorum* and possibly other hybrids. Ann. Soc. Agric. Bot. Gand,2:t.81,83, 106(c). Witte, Flora,t.73(c). Orig. about 1840.—Var. **plènum** Rehd. Forms with double fls. F.S.13:t.1298(c);19:t.2021–24(c). F.P.1880:t.516(c).—*R. gandavense* × *molle* = **R. mixtum** Wils. Mostly double-fld. forms, pink, red or yellow. R.B. 19:232,t(c). G.W.15:493(h). Millais, Rhodod.220(h). Orig. before 1890.

54. **R. occidentàle** Gray. Shrub to 3 m.; young brts. soft-pubescent or glabrous; winter-buds puberulous or sometimes nearly glabrous: lvs. elliptic to oblong-lanceolate, 3–9 cm. long, acute or obtusish and mucronulate, cuneate, ciliate, thinly pubescent on both sides when young or nearly glabrous, at maturity usually pubescent only on midrib above and strigose on midrib beneath: fls. 6–12, usually after or with the lvs., rarely before; corolla funnelform, white or pinkish with yellow blotch, villous and glandular-pilose outside, 3.5–5 cm. across; tube about 2 cm. long, gradually dilated upward, as long as lobes; stamens exserted, style as long or longer; ovary glandular-pilose; sepals broad-ovate to oblong-ovate, 1.5–4 mm. long, ciliate; pedicels usually glandular-pubescent: fr. ovate-oblong, 1–2 cm. long, setose-pilose. Fl.VI–VII (V–VIII). B.M.5005(c). F.S.14:t.1422(c). Gn.34:416,t(c). G.C.II.26:105. G.W.11:8(h). (*Azalea Californica* Torr. & Gr.) Ore., Calif. Intr. 1850. Zone VI or VII.—Handsome shrub with showy fls.; lvs. turning scarlet and yellow in autumn.

R. o. × *molle* = *R. albicans;* see under No. 52.—There are also hybrids with *R. calendulaceum* and with *R. gandavense.*

55. **R. calendulàceum** Torr. Shrub to 3 m., rarely to 5 m.; young brts. pubescent and strigillose; winter-buds glabrous, with ciliolate scales: lvs. broad-elliptic to elliptic-oblong or obovate-oblong, 4–8 cm. long, acute and gland-tipped, broad-cuneate, finely pubescent above and more densely so beneath when young: fls. usually 5–7, shortly after the lvs.; corolla yellow or orange to scarlet, nearly scentless, about 5 cm. across, glandular and pubescent

outside, tube gradually dilated above the middle, 1.5–2 cm. long, as long or shorter than the ovate lobes; stamens much exserted, style as long or longer; ovary setose, glandless; sepals oblong, 3–4 mm. long or ovate and shorter; pedicels setulose and usually glandular: fr. ovoid-oblong, 1.5–2 cm. long, setose and pubescent. Fl.v–vi. B.M.180(c). L.B.624(c). K.S.351. C.L.11: 496. (*R. luteum* Schneid., not Sweet, *Azalea calendulacea* Michx., *A. lutea* L., partly.) Pa. to Ga. w. to Ohio and Ky. Cult. 1800. Zone V.—One of the most showy species. The chief color forms are the two following: Var. **croceum** Sweet. Fls. yellow to orange-yellow. B.M.1721(c). L.B.132(c).—Var. **aurántium** Rehd. Fls. deep orange-red to scarlet. B.R.145(c). L.B.1255(c).

R. c. × *nudiflorum* = **R. Mortièri** Sweet (possibly including *R. speciosum* × *nudiflorum*). Fls. more or less pinkish, with orange blotch: lvs. glabrescent. S.B.II.1:t.10(c). L.B.1382(c). B.R.1366,1402,1407,1559(c). Orig. before 1830. —*R. c.* × *arborescens* = **R. Annelièsae** Rehd. Lvs. glabrous and usually glaucous beneath, with strigose midrib: fls. fragrant, usually pinkish with yellow blotch, tube longer than lobes. Orig. about 1896; also spontaneous in N. C.

Another yellow-fld. species related to *R. canescens* is **R. austrînum** Rehd. Brts. pubescent and glandular; winter-buds pubescent: lvs. elliptic to oblong-obovate, finely pubescent on both sides: fls. many, before or with the lvs., yellow to orange, usually with purplish stripes outside, tube cylindric, longer than lobes; ovary setose and glandular; pedicels and calyx glandular. (*Azalea austrina* Small.) Fla. Intr. 1914. Zone VII or VIII.

56. **R. speciôsum** Sweet. Shrub to 2 m.; young brts. finely pubescent and strigillose; winter-buds glabrous: lvs. elliptic or obovate to oblong, 3–6 cm. long, acute or obtusish and mucronate, broad-cuneate, strigillose above, finely pubescent beneath or sometimes nearly glabrous except on midrib: fls. 6–15, with the lvs.; corolla scarlet or bright red with yellow blotch, 4–5 cm. across, pubescent and pilose outside, tube slender, 2–2.5 cm. long, longer than lobes; stamens much exserted, slightly shorter than style; ovary setose, not glandular; sepals broad-ovate to oblong, ciliate; pedicels strigillose: fr. ovoid to narrow-oblong, 2–3 cm. long, strigose. Fl.v. B.M.180(c). G.O.t.31 (c). W.D.116(c). L.B.624(c). (*R. calendulaceum* f. *s.* Voss, *A. speciosa* Willd., *A. nudiflora* var. *coccinea* Ait.) Ga. to S. C. Cult. 1789. Zone VI or VII?—Very handsome species with bright red fls.

R. s. × *nudiflorum*. Probably some forms of *R. Mortieri* (see under No. 55) represent this cross.

57. **R. nudiflôrum** Torr. Shrub to 2, rarely to 3 m.; young brts. slightly pubescent and strigillose or nearly glabrous; winter-buds glabrous or slightly pubescent: lvs. elliptic or obovate to oblong or oblong-obovate, 3–8 cm. long, acute or acuminate, cuneate, ciliate, glabrous and green beneath, except strigillose or sometimes slightly pubescent on midrib: fls. 6–12, before the lvs., scentless; corolla usually light pink or white with pink tube, 3–4 cm. across; tube cylindric, 1.5–2 cm. long, gradually dilated above, strigose-pilose and puberulous outside, longer than the rather narrow and acuminate lobes; stamens much exserted, nearly 3 times as long as tube; style slightly longer; ovary setose, glandless; sepals roundish to ovate, rarely oblong, 1.5–2 mm. long; pedicels strigillose and sometimes puberulous, rarely glandular: fr. oblong to narrow-oblong, 1–2 cm. long, Fl.iv–v. S.O.3:t.170(c). B.R. 120(c). Em.440,t(c). K.S.347. Gn.M.5:218(h). W.A.52,t(h). (*Azalea nudiflora* L., *A. lutea* L., partly, *A. periclymenoides* Michx.) Mass. to N. C. w. to Ohio. Intr. about 1730. Zone V.—Var. **album** Sweet. Fls. white.—Var. **glandíferum** Rehd. Corolla puberulous and glandular-pilose outside, usually pink to carmine. (*Azalea nudiflora* var. *glandifera* Porter.) L.B.51(c). —Handsome shrub with white to pink fls. before the lvs. which are bright green.

R. n. × *calendulaceum* = *R. Mortieri;* see under No. 55.—*R. n.* × *luteum* = *R. gandavense;* see under No. 53.—*R. n.* × *ponticum* = *R. azaleoides;* see p. 691.

58. **R. ròseum** Rehd. Shrub to 3, rarely to 5 m.; young brts. finely pubescent and usually sparingly strigillose; buds grayish pubescent: lvs. elliptic or obovate to obovate-oblong, 3–7 cm. long, acute or short-acuminate, dull bluish green and sparingly pubescent above, grayish pubescent beneath: fls. 5–9, with the lvs., fragrant; corolla bright pink, rarely whitish, about 4 cm. across, tube rather gradually dilated, 1.5–2 cm. long, about as long as the ovate lobes; stamens about twice as long as tube, style longer, purple above; ovary setose and glandular; sepals roundish to ovate, pubescent, glandular-ciliate; pedicels villous and glandular: fr. oblong, 1.5–2 cm. long, slightly puberulous and glandular-setose. Fl.v. N.D.5:t.64(c). M.M.2:t.2(c). Gd.W. t.36(c). K.S.349. (*R. canescens* Porter, not Torr., *R. prinophyllum* Millais, *Azalea rosea* Lois., *A. prinophylla* Small.) N. H. and s. Quebec to Va. (not on the coastal plain), w. to Ill. and Mo. Intr. 1812 or possibly about 1790. —Handsome shrub with fragrant pink fls. appearing with the lvs. which are bluish green.

Related species are: **R. canéscens** Sweet. Sparingly branched shrub to 5 m.; young brts. villous-pubescent: lvs. oblong-obovate or oblong to oblanceolate, 4–9 cm. long, grayish pubescent or tomentose beneath: fls. before or with the lvs. slightly fragrant, about 3.5 cm. across, tube slender, 1.5–2.3 cm. long, villous and sometimes glandular outside, longer than lobes, tube usually pink, lobes white; stamens much exserted; ovary villous, sparingly setulose; glandless. Abbot, Nat. Hist. Lepidopt. Georgia,1:t.27(c). (*Azalea c.* Michx., *A. bicolor* Pursh.) N. C. and Fl. to e. Tex. Intr. 1750? Zone VII or VIII?—Var. **candidum** Rehd. Lvs. glaucous beneath and pubescent. (*Azalea candida* Small.) Ga. to n. Fla.—Var. **subglâbrum** Rehd. Lvs. glabrous or glabrescent. Ga. and Ala. to e. Tex. Intr. 1916. Zone VIII?—**R. alabaménse** Rehd. Low shrub; young brts. strigose-pilose; buds glabrous: lvs. elliptic or obovate to obovate-oblong, 3–6 cm. long, slightly puberulous above when young, pale or glaucescent and short-villous beneath: fls. with the lvs., fragrant, white, 4–5 cm. across, tube gradually dilated, 2–2.8 cm. long; stamens twice as long as tube. Ala. Intr. 1922. Zone VIII?

59. **R. atlânticum** Rehd. Stoloniferous shrub, to 0.5 m., sometimes taller; young brts. sparingly strigillose, sometimes glandular; buds glabrous or slightly pubescent: lvs. obovate to oblong-obovate, rarely elliptic, 3–6 cm. long, rounded or acutish at apex, glabrous above and bright or bluish green, glabrous beneath except the strigillose and sometimes pubescent midrib, fls. 4–10, before or with the lvs., very fragrant; corolla white, usually flushed pink or purplish, glandular-pilose outside, not or slightly villous; tube cylindric, 2–2.5 cm. long, glabrous inside; stamens twice as long as tube, style longer; ovary setose, with or without glands; sepals glandular-ciliate, rarely eglandular; pedicels hirsute or glandular-hirsute: fr. ovoid-oblong, 1.5–2 cm. long. Fl.IV–V. Jour. Elisha Mitchell Soc. 36:t.1(c). (*Azalea atlantica* Ashe.) Del. to S. C. Zone VI? Intr. about 1916.—Var. **negléctum** Rehd. Fls. purplish pink, tube slightly shorter, wider and more villous outside. N. and S. C. —Handsome low shrub with very fragrant white to purplish fls.

60. **R. viscòsum** Torr. Shrub to 3, rarely to 5 m.; young brts. strigillose or hirsute; buds glabrous or sometimes pubescent, with 8–12, ovate obtusish and usually mucronulate scales: lvs. ovate or elliptic-obovate to oblong-oblanceolate, 2–6 cm. long, acute or obtuse, glabrous except the slightly villous and strigillose midrib beneath, sometimes strigillose above, bright green or glaucescent beneath: fls. 4–9, after the lvs.; corolla white or suffused with pink, finely villous and glandular-hirsute outside; tube cylindric, somewhat dilated near apex, 1.5–2.5 cm. long, about 1½ times as long as the ovate-oblong lobes, slightly pubescent inside above the middle; stamens somewhat longer

than lobes, style longer, pale or purplish near apex; ovary glandular-setose, sometimes glandless; sepals roundish to ovate, about 1 mm. long, setose-ciliate; pedicels pubescent and glandular: fr. oblong-ovoid, 1.3–2 cm. long. Fl.VI–VII. Em.438,t(c). S.O.3:t.171(c). M.M.10t.6(c). (*Azalea viscosa* L.) Me. to S. C., in swamps. Cult. 1731. Zone IV.—Var. **rhodánthum** Rehd. Fls. bright pink.—Var. **glaùcum** Torr. Lvs. glaucous beneath and sometimes bluish green above. S.O.3:t.172(c). W.D.t.5(c). (*Azalea v.* var. *glauca* Ait.) With the type; a form with intensely pink fls. is var. **rubéscens** Rehd. (*R. v.* var. *roseum* Hollick, *Azalea v.* var. *r.* Sweet.)—Var. **nítidum** Gray. Lvs. obovate-oblong to oblanceolate, acute or abruptly acuminate, green on both sides, sometimes strigillose above: fls. usually pinkish.—Var. **montànum** Rehd. Low shrub to 1.2 m.; brts. puberulous and hirsute like the pedicels and midrib beneath; winter-buds silky-pubescent, with 5–7 rounded scales: lvs. obovate to obovate-oblong; bright green: fls. suffused with pink and with numerous stipitate red glands. N. C. Intr. 1919.—Var. **coeruléscens** Rehd. A form of the preceding var. with the lvs. glaucous beneath and bluish green above and the fls. more highly colored. Intr. 1913.—Var. **tomentòsum** Rehd. Lvs. densely pubescent beneath and slightly above. (*Azalea tomentosa* Dum.-Cours.)—Grown chiefly for its late and fragrant fls.

R. v. × *molle* = **R. viscosépalum** Rehd. Lvs. larger, thinly pubescent and glaucescent beneath: fls. larger, white with yellow blotch, yellowish in bud; tube shorter, more dilated, more puberulous outside; stamens not or slightly exceeding the lobes. ?S.L.348(h). (*Azalea viscosepala* Gard. Chron., *A. viscocephala* Arb. Kew.) Orig. about 1840.—Var. **Davièsii** Rehd. Fls. larger, with more conspicuous yellow blotch and with shorter wider tube. Gt.42:65,t(c). B.R.28:27. (*Azalea D.* Gard. Chron.)—*R. v.* × *maximum* = *R. hybridum;* see p. 692.—*R. v.* × *catawbiense* = *R. fragrans;* see p. 692.

Related species are: **R. serrulàtum** Millais. Shrub to 7 m.; young brts. usually densely strigose; buds glabrous or sometimes grayish pubescent, with 15–20 mucronate to aristate scales: lvs. elliptic to obovate or obovate-oblong, 4–8 cm. long, usually acute, serrulate-ciliate, glabrous except the midrib or sometimes pubescent: fls. white, very fragrant; tube slender, 2.5–3.3 cm. long, about twice as long as the ovate-lanceolate lobes; style much longer than stamens. Ga. to Fla. and La. Intr. 1919. Zone VIII?—**R. oblongifòlium** Millais. Shrub to 2 m.; brts. finely villous and sparingly strigose or nearly glabrous; buds grayish pubescent: lvs. obovate to oblong-oblanceolate, 4–10 cm. long, acute or acutish, pubescent beneath to nearly glabrous and sometimes glaucescent: fls. before the terminal buds are formed; white; tube abruptly dilated at apex, 2.5–3 cm. long; villous outside and often sparingly glandular-hirsute; sepals ovate to lanceolate, 1–3 mm. long. (*Azalea oblongifolia* Small.) Ark., Okl. and Tex. Intr. 1917. Zone VIII?

61. **R. arboréscens** Torr. Shrub to 3, rarely to 6 m.; brts. glabrous, rarely with few scattered hairs, often slightly bloomy; buds glabrous: lvs. obovate to elliptic or oblong-oblanceolate, 3–8 cm. long, acute or obtuse, ciliate, glabrous and bright green above, glaucous or sometimes green beneath and glabrous or sparingly strigose or pubescent on midrib, fragrant when dry; petioles slender, glabrous or nearly so: fls. 3–6, after the lvs., very fragrant; corolla white or pinkish, glandular-hirsute outside and sometimes slightly villous; tube 2.5–3 cm. long, slightly dilated at apex, pubescent inside, longer than the ovate-oblong acuminate lobes; stamens about twice as long as tube, purple above; style as long or longer than stamens, usually glabrous, purple above; ovary glandular-setose; sepals ovate to narrow-oblong, 3–6 mm. long, glandular-ciliate; pedicels glandular-hirsute or glandless, sometimes nearly glabrous: fr. oblong-ovoid, 1–1.7 cm. long. Fl.VI–VII. L.B.1632(c, as *Azalea verticillata.*) L.S.t.75(c). G.F.1:401. C.L.11:496. (*Azalea a.* Pursh.) S. Pa. to Ga. and Ala., chiefly in the mts. Intr. before 1814. Zone V.—Var. **Richardsònii** Rehd. Lower, to 1.5, rarely to 2.5 m.: lvs. somewhat smaller; fls. more villous and

more glandular; sepals shorter, villous outside; style pubescent near base. High mts. of N. C. Intr. 1917. Zone V.—Very handsome shrub with large white deliciously fragrant fls.

A related species is **R. prunifòlium** Millais. Glabrous shrub to 3 m.; lvs. elliptic to oblong, 3–12 cm. long, light green beneath, acute to acuminate: fls. 4–5, crimson, glabrous or sparingly hirsute outside; stamens much exserted, style longer, to 8 cm. long, glabrous; ovary glandless. Ga. to Ala. Intr. 1918. Zone VII or VIII?

Subgen. IV. THERORHODION Maxim.

62. **R. kamtschàticum** Pall. Shrub to 30 cm. high; young brts. sparingly glandular-pilose: lvs. short-petioled or nearly sessile, obovate to oblong-obovate, rounded and mucronate at apex, cuneate, ciliate, sparingly pilose beneath, thin and reticulate: fls. 1–3 on glandular-pilose pedicels 1.5–3.5 cm. long; corolla rose-purple 2.5–3.5 cm. across, with short tube; stamens villous near base; style longer than stamens. Fl.VII–VIII. B.M.8210(c). Gt.36:t.1200. P.F.1:t.22(c). J.F.1:t.53. G.W.13:554(h). S.L.57(h). N. E. Alaska to B. C. Intr. about 1800. Zone I?—Difficult to grow; best in rockery in moist and cool situation.

The related *R. Redowskianum* Maxim. from N. E. Asia and *R. glandulosum* Millais (*Therorhodion g.* Small) from N. W. Am. are apparently not yet in cult.

6. **MENZIÈSIA** J. E. Sm. Small deciduous shrubs; buds small with several outer scales: lvs. alternate, petioled, entire: fls. in terminal clusters, 4–5-merous; sepals short; corolla campanulate or urceolate, with 4–5 short rounded lobes; stamens 5–10, included, rarely the anthers exserted; anthers opening by apical pores; disk 8–10-lobed; ovary 4–5-celled; ovules many: caps. 4–5-valved, leathery; seeds linear, pointed or caudate at ends. (After Archibald Menzies, English surgeon and naturalist; 1754–1842.) Seven species in N. Am. and E. Asia.—Interesting shrubs for the rockery, but of no particular ornamental merit.

M. pilòsa Pers. Shrub to 2 m.; brts. slightly pubescent: lvs. elliptic to oblong-obovate, 1.5–5 cm. long, abruptly mucronate, cuneate, ciliate, sparingly appressed-pilose above, less so and glaucous beneath, short-petioled: fls. few, drooping, 4-merous; pedicels 1–2.5 cm. long, glandular-pubescent; sepals ciliate; corolla campanulate, 6–7 mm. long, yellowish white or pinkish; stamens included, 8, glabrous; style as long as corolla: caps. ovoid, glandular-setose. Fl.V–VI. B.M.1571(c). G.O.t.27(c). I.T.3:t.104. B.B.2:682. B.S.2: 80. (*M. globularis* Salisb.) Pa. to Ga. and Ala. on the mts. Intr. 1806. Zone V.

Other species occasionally cult. are: **M. ferrugínea** Sm. Lvs. glandular-ciliate; petiole pilose: pedicels glandular-hirsute; calyx long-ciliate; corolla 4-merous, cylindric, 9–13 mm. long; filaments pubescent. Smith, Pl. Icon. Ined.56. Brown & Schaeffer, Alp. Fl. Can.t.61. Alaska to Ore. Intr. 1811.—**M. glabélla** Gray. Lvs. obovate, usually obtuse, crenate-serrulate and minutely ciliate; glabrous or nearly so and glaucous beneath: corolla 4-merous, ovoid-campanulate, 7–9 mm. long; filaments pubescent below. B.B.2:682. Henshaw, Mtn. Fl. Am.t.98. B. C. and Alb. to Wyo., Minn. and Idaho. Intr. about 1885.—**M. ciliicalyx** Maxim. Brts. glabrous: lvs. elliptic, ciliate, otherwise glabrous; pedicels glandular-hispid; calyx ciliate; corolla 4–5-merous, yellowish green with purplish limb, oblong-ovoid, 1.5 cm. long; stamens 8–10, pubescent. N.T.1:35. S.H.2:f.334h-i. Mém. Acad. St. Pétersb.VII.16,9:t.1,f.1–6. Japan. Intr. 1915.—Var. **multiflòra** Mak. Fls. 6–10; pedicels glabrous. J.C.27,11:t.3,f.5–8(c). (*M. m.* Maxim.) Jap. Intr. 1915.—**M. purpúrea** Maxim. Lvs. elliptic to elliptic-obovate, 2.5–4 cm. long, obtuse and mucronulate, sparingly strigose above and on the midrib beneath: fls. 4–5-merous, campanulate, 12–15 mm. long, bright red, the lobes ciliolate; filaments pubescent; sepals ciliate. Mém. Acad. St. Pétersb.VII.16,9:t.1,f.13–19. S.H.2:f.334. N.K.1:33. Japan. Intr. 1915. Zone V? The handsomest species on account of its bright fls.—**M. pentándra** Maxim. Lvs. elliptic to elliptic-oblong,

1.5–4 cm. long, acute, ciliate: corolla 5-merous, whitish, globose-urceolate, 5–7 mm. long, 5-lobed; stamens 5, glabrous. N.T.1:38. S.H.2:f.334a-b. Saghal., Japan. Intr. 1905 or 1892?

7. **TSUSIOPHYLLUM** Maxim. Half-evergreen low shrub, with strigose pubescence; winter-buds with few scales: lvs. alternate, small, entire: fls. 1–2, terminal, 5-merous; sepals oblong, small; corolla tubular, with short spreading limb; stamens 5, included; style shorter than stamens; anthers opening by slits; ovary 3-celled. (*Tsusia*, a subgenus of Rhododendron, and Greek *phyllon*, leaf.) One species in Japan.

T. Tânakae Maxim. Shrub to 0.5 m.; brts. strigose: lvs. elliptic-obovate, 8–12 mm. long, acute, strigose above, glaucous and glabrous beneath except the strigose midrib: fls. short-stalked, white or pinkish; corolla about 1 cm. long, pubescent outside and inside; ovary strigose. Fl.vi. N.T.1:28. Mém. Acad. St. Pétersb.VII.16,9:t.3,f.1–8. S.H.2:f.334o-q. Japan. Intr. 1915. Zone (V).—Interesting low shrub for the rockery, but of no ornamental value.

8. **LEIOPHÝLLUM** Hedw. Evergreen low shrubs; buds minute, pointed, with indistinct scales: lvs. alternate or opposite, short-petioled, crowded, small, entire, coriaceous: fls. slender-pediceled, in terminal umbel-like corymbs; sepals 5, narrow-oblong to lanceolate, about half as long as petals; petals 5, broad-ovate to ovate-oblong, white or pink; stamens 10, longer than petals, glabrous; anthers opening lengthwise, disk 10-lobed; ovary 2–3-, rarely 5-celled; style slender, not exceeding the stamens: caps. ovoid, surrounded by the persistent calyx, 2–5-valved, many-seeded. (Greek *leios*, smooth, and *phyllon*, leaf.) Syn.: *Ammyrsine* Pursh, *Dendrium* Desv. One species in E. N. Am.

L. buxifòlium Ell. Upright shrub to 0.5 m., glabrous: lvs. usually alternate, oblong or obovate-oblong, 3–8 mm. long, lustrous above, paler beneath: pedicels glabrous; petals ovate-oblong to oblong, 2–2.5 mm. long; disk minute; stamens about twice as long as petals; style twice or thrice as long as ovary; caps. ovoid, 3 mm. long, smooth. Fl.v–vi. B.R.531(c). Gd.W.t.49(c). L.B.52(c). Gn.87:243(h). S.L.242(h). (*Dendrium b.* Desv., *Ledum b.* Berg.) N. J. Intr. 1736. Zone V.—Var. **Hùgeri** Schneid. Upright shrub to 0.4 m.: lvs. alternate, oblong to oblong-ovate, 9–15 mm. long; pedicels finely pubescent and glandular; petals broad-ovate to rhombic-ovate; stamens slightly longer than petals; style less than twice as long as ovary: caps. scabrous on back. B.M.6752(c, as *L. buxifolium*). (*L. H.* K. Schum., *Dendrium H.* Small.) N. and S. C. Cult. 1884.—Var. **prostràtum** Gr. Prostrate or diffuse shrub: lvs. mostly opposite, oval to elliptic-oblong, 4–7 mm. long; otherwise similar to the preceding var., caps. tuberculate on back. Lounsberry, S. Wild Fl.t.122. (*L. Lyoni* Sweet, *Ammyrsine Lyoni* Sweet, *Dendrium L.* Small.) High mts. of N. C. and Tenn. Intr. 1912.—Attractive low evergreen shrubs covered with small white fls. in May or June, adapted for the rockery.

9. **LOISELEÙRIA** Desv. Evergreen prostrate shrub, glabrous; buds minute with indistinct scales: lvs. mostly opposite, small, usually crowded, entire, coriaceous, short-petioled: fls. few, in terminal clusters, short-pediceled; calyx-lobes 5, about half as long as corolla; corolla broad-campanulate, with spreading ovate lobes about as long as tube; stamens 5, shorter than corolla, glabrous; anthers opening lengthwise; ovary 2–3-celled seated on a disk; style cylindric, shorter than stamens: [caps. surrounded by the persistent calyx, 2–3-valved; seeds many. (After J. C. A. Loiseleur-Deslong-

champs, prominent French botanist and physician; 1774–1849.) Syn.: *Azalea* L., *Chamaecistus* S. F. Gray. One circumpolar species.

L. procúmbens Desv. Depressed shrub, rarely to 20 cm. high: lvs. oval to oblong, 3–8 mm. long, obtuse, revolute, often glaucous beneath, with prominent midrib: fls. 1–5, on pedicels 3–10 mm. long; calyx-lobes oblong to oblong-lanceolate, corolla pink or whitish, 4–5 mm. long: caps. ovoid, 3–4 mm. long. Fl. VII–VIII. L.B.762(c). R.I.17:t.108,f.2(c). F.D.20:t.2028. N.D.5:t.65(c). G.C.III.53:343. S.L.55(h). (*Azalea p.* L., *Chamaecistus p.* Ktze.) Eu., N. Asia, in N. Am. from Alaska to Nfdl., s. to N. H. Cult. 1800. Zone I.—Attractive depressed shrub for the alpine rockery.

10. **RHODOTHÁMNUS** Reichenb. Evergreen dwarf shrub: lvs. alternate, short-petioled, small, entire: fls. terminal, 1–3, on slender pedicels; sepals 5, half as long as corolla; anthers opening by apical pores, dark brown; style about as long as stamens; ovary 5-celled: caps. 5-valved, many-seeded. (Greek *rhodon*, rose, and *thamnos*, shrub; alluding to the rose-colored fls.) Syn.: *Adodendrum* Neck. One species.

R. chamaecístus Reichenb. Diffusely branched shrub to 0.3 m.; brts. slender, glandular-pubescent when young: lvs. narrow-elliptic to cuneate-oblong, 8–12 mm. long, acute, ciliate, dark green and sparingly setose above, paler and glabrous beneath: fls. 2–2.5 cm. across, bright purple; pedicels and calyx glandular-hirsute. Fl. V–VI. B.M.488(c). L.B.1491(c). F.S.19:t.1962(c). R.I.17:t.106,f.4,5(c). G.C.III.33:293. Gn.89:264(h). (*Rhododendron c.* L., *Adodendron c.* Ktze.) Eu. Alps, E. Siberia. Intr. about 1790. Zone V?—Low shrub with handsome fls. for the alpine rockery.

R. e. × *Phyllodoce empetriformis;* see 10a. *Phyllothamnus.*

10a. × **PHYLLOTHÁMNUS** Schneid. (*Phyllodoce* × *Rhodothamnus*)

P. erêctus Schneid. (*Phyllodoce empetriformis* × *Rhodothamnus chamaecistus*). Evergreen shrub to 0.3 m.; lvs. linear, about 1.2 cm. long, slightly serrulate, glabrous: fls. 2–10, rotate-campanulate, about 1.2 cm. across, rosy pink, on pubescent pedicels; sepals about ½ as long as corolla. Fl. VI–VIII. F.S.7:t.659(c). E.P.IV.1:39. J.F.1:58. P.F.1:t.19(c). S.H.2:f.337o. (*Phyllodoce e.* Drude, *Bryanthus e.* Lindl.) Orig. about 1845. Zone V.

11. **KÁLMIA** L. Evergreen, rarely deciduous shrubs; buds with about 2 outer scales: lvs. alternate, opposite or whorled, entire, petioled, rarely sessile: fls. in terminal or lateral corymbs or umbels; pedicels in the axils of small thick bracts; calyx 5-parted, small, persistent; corolla saucer-shaped or broad-campanulate; stamens 10, with slender filaments; anthers opening by apical pores, held back in little pouches and springing up suddenly by the straightening of the slender filaments when the corolla expands or if touched; style slender; ovary 5-celled; caps. subglobose to globose-ovoid, 5-valved; seeds numerous, minute. (After Peter Kalm, Swedish botanist; traveled from 1748–1751 in N. Am.) About 8 species in E. N. Am. and W. Ind.

A. Fls. terminal.
B. Infl. compound: lvs. alternate, 5–10 cm. long, acute, petioled . . . . . 1. *K. latifolia*
BB. Infl. simple: lvs. opposite or ternate, 0.5–3 cm. long, obtuse, subsessile . . . 2. *K. polifolia*
AA. Fls. lateral; corolla 5–10 mm. across: lvs. usually opposite, obtuse or acutish, 2–6 cm. long. 3. *K. angustifolia*

1. **K. latifòlia** L. Mountain Laurel. Shrub or small tree, occasionally to 10 or 12 m.; glabrous except infl.: lvs. alternate or irregularly whorled, elliptic to elliptic-lanceolate, 5–10 cm. long, acute or short-acuminate, cuneate,

dark green above, yellowish green beneath; petiole 1–2 cm. long: fls. in large terminal glandular-pubescent corymbs; pedicels slender, 1–3.5 cm. long; corolla saucer-shaped, 2–2.5 cm. across, viscid outside, usually rose-colored, with purple markings within; ovary glandular: caps. 5–7 mm. across. Fl. v–vi. B.M.175(c). Em.443,t(c). M.M.183,t(c). S.S.5:t.236. Gng.7:289(h). G.C.III.66:203(h). M.G.18:576–9(h). S.L.238(h). N. B. to Fla. w. to Ohio and Tenn. Intr. 1734. Zone V or (IV)—Var. **alba** Bosse. Fls. white or nearly white. Cult. 1840.—Var. **rúbra** K. Koch. Fls. deep pink. R.H.1888: 540,t(c). (Var. *Pavartii* André.) Cult. 1870.—Var. **fuscàta** Rehd. Corolla inside with a broad dark purplish brown band. Intr. 1925.—Var. **polypétala** Nichols. Corolla divided into 5 narrow petals which give the infl. a feathery appearance. G.F.3:453. B.C.3:1734. (Var. *monstrosa* Mouillef.) Intr. about 1885.—Var. **myrtifòlia** Bosse. Low slow growing shrub with darker green smaller lvs. only 2–5 cm. long. G.F.8:317. R.H.1883:11. Gn.29:379.33:603. B.C.3:1734. (Var. *nana* Hort., var. *minor* Hort.) Cult. 1840.—Var. **obtusàta** Rehd. Of compact habit and slow growth; lvs. elliptic, obtuse at ends, 5–7 cm. long. Intr. 1886.—One of the most beautiful American flowering shrubs.

2. **K. polifòlia** Wangenh. Low straggling shrub to 0.7 m.; brts. 2-edged, glabrous or puberulous; lvs. sessile or nearly so, usually oblong, 2–3.5 cm. long, obtuse, revolute, glaucous-white beneath, glabrous: fls. in several-fld. terminal umbels; pedicels slender, 2–3 cm. long, glabrous; calyx-lobes ovate-oblong, obtuse: corolla 1–1.5 cm. across, rose-purple; caps. glabrous. Fl.v–vi. B.M.177(c). L.B.1508(c). Em.441,t(c). Gd.W.t.18(c). S.L.239(h). (*K. glauca* Ait., *K. occidentalis* Small.) Lab. and Hudson Bay to Pa. and Minn. and from Alaska to Wash. Intr. 1767. Zone II?—Var. **rosmarinifòlia** Rehd. Lvs. linear-oblong, strongly revolute. (*K. glauca* var. *r.* Pursh.)—Var. **microphýlla** Rehd. Low diffusely branched shrub to 20 cm. high: lvs. ovate or obovate to elliptic-oblong, 5–20 mm. long, scarcely revolute; pedicels longer; corolla 8–12 mm. long. Brown & Schäffer, Alp. Fl. Can.t.61(c). (*K. glauca* var. *m.* Hook, *K. m.* Heller.) Yukon to Mont., Colo. and Calif. Intr. 1904.—Low evergreen shrub with attractive rosy-purple fls.

3. **K. angustifòlia** L. Sheep-Laurel. Shrub to 1 m., rarely to 1.5 m.; brts. glabrous or nearly so: lvs. short-petioled, oblong to lanceolate, 2–6 cm. long, obtuse or acutish, bright green above, paler beneath, glabrous at least at maturity: fls. in many-fld. axillary clusters; pedicels puberulous; calyx-lobes ovate, slightly glandular, corolla about 1 cm. across, usually purple: caps. sparingly puberulous and glandular. Fl.vi–vii. B.M.331(c). M.N.H. 2:t.45(c). Em.445,t(c). Nfdl. and Hudson Bay to Mich. and Ga. Intr. 1736. Zone I.—Var. **rósea** Rehd. Fls. light purple.—Var. **rúbra** Lodd. Fls. crimson. L.B.502(c).—Var. **cándida** Fern. Fls. white.—Var. **ovàta** Pursh. Lvs. ovate or elliptic.—Var. **pùmila** Bosse. Dwarf form. (Var. *nana* Hort.)

A closely related species is **K. carolìna** Small. Young growth pubescent: lvs. gray-tomentulose beneath: corolla 5–7 mm. across, pink or purple. B.B.2:684. Va. to S. C. Intr. 1906. Zone V.—Two species with axillary fls. are: **K. cuneàta** Michx. Deciduous shrub to 1 m.: lvs. alternate, obovate-oblong, 1.5–5 cm. long, obtusish, cuneate, pubescent beneath when young: fls. few, slender-pediceled, about 1.5 cm. across, whitish. B.M.8319(c). G.F.8:435. B.C.3:1735. B.S.1:679. N. and S. C. Intr. 1820. Zone VI?—**K. hirsùta** Walt. Evergreen shrub to 0.6 m.: lvs. alternate, subsessile, elliptic to lanceolate, 5–10 mm. long, hirsute: fls. solitary, 1–1.5 cm. across, on slender hirsute pedicels; sepals deciduous, oblong-lanceolate, hirsute. B.M.138(c). L.B.1058(c). L.S.t.126(c). (*Kalmiella h.* Small.) Va. to Fla. and Ala. Intr. 1790. Zone VII or VIII?

12. **PHYLLÓDOCE** Salisb. Evergreen prostrate or ascending shrubs: lvs. alternate, crowded, linear, revolute, usually serrulate: fls. in terminal umbels,

nodding, on slender pedicels; calyx 4–6-parted, small, persistent: corolla urceolate or campanulate, 4–6-lobed; stamens 8–12; anthers oblong, opening by a large pore; style slender; caps. globose to ovoid, 4–6-valved, many-seeded. (After Phyllodoce, a sea-nymph.) Six or 7 species in N. Am., N. Eu. and N. Asia.—Low evergreen shrubs with heath-like foliage and attractive fls. for the alpine rock garden.

A. Corolla urceolate, slightly lobed; calyx pubescent.....1. *P. coerulea*
AA. Corolla campanulate; calyx glabrous or glandular.....2. *P. empetriformis*

1. **P. coerulea** Bab. Depressed shrub to 15 cm. tall: lvs. linear 4–9 mm. long, obtuse, serrulate, slightly glandular at first: fls. 2–6, ovoid to urceolate, 7–8 mm. long, glabrous, purple, turning bluish in drying; sepals linear to lanceolate; stamens included, glabrous. Fl.VI–VIII. L.B.164(c). S.E.6:t.886 (c). N.K.8:t.5. G.W.17:261. S.L.293(h). (*P. taxifolia* Salisb., *Andromeda c.* L., *Bryanthus taxifolius* Gray.) Greenland to Que., s. to N. H.; N. Eu., N. Asia. Cult. 1800. Zone I.

Related species are: **P. glandulifiòra** Cov. To 30 cm. tall: lvs. linear to linear-oblong, 4–14 mm. long: fls. 3–8; calyx glandular; corolla sulphur-yellow, pubescent outside; filaments pubescent; sepals lanceolate to oblong-lanceolate. Brown & Schäffer, Alp. Fl. Can.t.59b. Henshaw, Mtn. Fl. Am.t.26. Alaska to Mont. and Ore. Intr. about 1885.—**P. aleùtica** A. Heller. To 20 cm. tall: lvs. linear: fls. 6–14, white or whitish, globose-urceolate; sepals linear to linear-lanceolate; filaments glabrous. Mém. Acad. Sci. St. Pétersb.VI.2:t.3. Alaska, N. E. Asia. Intr. 1915.

2. **P. empetrifórmis** D. Don. Ascending shrub to 15 cm.: lvs. linear to linear-oblong, 6–15 mm. long, obtuse or acutish, serrulate, glabrous: fls. several to many; corolla campanulate, 7–9 mm. long, rosy-purple, its lobes much shorter than tube; stamens included; sepals ovate to ovate-oblong, obtuse, glabrous. Fl.V–VII. B.M.3176(c). C.L.21:41. B.S.2:148. S.L.293(h). (*Bryanthus e.* Gray.) B. C. to Calif. Cult. 1830. Zone V.—Var. **amàbilis** Rehd. Fls. smaller, broad-campanulate, whitish or pinkish; anthers short. B.M.8405(c). (*P. a.* Stapf.) Intr. before 1910.

P. e. × *Rhodothamnus chamaecistus;* see 10a. *Phyllothamnus.*

Related species are: **P. nippónica** Mak. To 15 cm. tall: lvs. linear, 5–10 mm. long, serrulate: fls. 3–10, white, 7–8 mm. long; stamens and style included; sepals ovate, acute, purple, glabrous; pedicels glandular, 1–1.5 cm. long. Japan. G.C. III.78:29. N.T.1:23. Intr. 1915. Zone V.—**P. brèweri** A. Heller. To 30 cm. long: lvs. linear, 6–20 mm. long: fls. axillary, forming terminal racemes; corolla divided to the middle; stamens exserted, filaments much longer than anthers. B.M.8146(c). G.C.III.78:27. Calif. Intr. about 1896. Zone VI?

A related genus is **Bryánthus** S. G. Gmelin; it differs chiefly in its 4-merous fls. borne in peduncled 3–10-fld. racemes, rotate corolla and 8 stamens. Its only species **B. muscifórmis** Nakai (*B. Gmelini* Don) is a prostrate shrub with evergreen linear remotely denticulate lvs. 2–3 mm. long: fls. rosy pink, 3–4 mm. across. Trans. Linn. Soc.10:t.30B. N.T.1:17. Kamtch., Behrings Isl. to Japan. Not yet in cult.

13. **DABOÈCIA** D. Don. Low evergreen shrub: lvs. alternate, entire, subsessile: fls. in terminal racemes; calyx small, 4-parted; corolla campanulate-urceolate, with 4 short recurved lobes; stamens 4, included; anthers with apical pores: caps. 4-valved; seeds small, globose-ovoid, verruculose. (St. Dabeoc's Heath, its Irish name.) Syn. *Boretta* Neck. One species in W. Eu.

D. cantábrica K. Koch. IRISH HEATH. Upright shrub to 0.5 m.; brts. glandular-pubescent: lvs. elliptic, 6–12 mm. long, the uppermost narrower, narrowed at ends, mucronate, revolute, dark green and lustrous above, whitish tomentose beneath: racemes elongated, glandular-pubescent: fls. short-pediceled, nodding; corolla 8–12 mm. long, purple. Fl.VI–XI. Gt.47:257,t(c). R.B.3:121,t(c). Gn.52:344,t(c);71:442(h). M.G.32:179(h). (*D. polifolia* Don, *Menziesia polifolia* Juss., *Boretta c.* Ktze.) Irel. to N. Spain and Azores. Cult. 1800. Zone (V).—Var. **alba** Dipp. Fls. white. S.B.II.3:t.276(c). Gt.

47:257,t(c). Gn.22:302;76:491(h). (*D. polifolia* var. *a.* Don.) Intr. about 1820.—Var. **bícolor** Dipp. Fls. striped white and purple. Gt.47:257,t(c). (*D. polifolia striata* Hort.)—Var. **ròsea** Rehd. Fls. pink. (*Boretta c.* var. *r.* Koopm.)—Var. **atropurpúrea** Dipp. Fls. rich purple.—Var. **nàna** Rehd Dwarf form with smaller and narrower lvs. L.B.20:1907(c). (*Menziesia polifolia n.* Lodd., *D. p.* var. *pygmaea* Nichols.)—Handsome summer-flowering shrub; prefers peaty soil.

Tribe 2. Andromedeae Drude. Fr. a loculicidal caps.: calyx dry, small: corolla deciduous.

14. **ENKIÁNTHUS** Lour. Deciduous, rarely evergreen shrubs with whorled brs.; winter-buds ovoid, with several outer scales: lvs. alternate, mostly crowded at end of brts., petioled, usually serrulate; fls. in terminal umbels or racemes, usually nodding; sepals 5, small; corolla campanulate or urceolate, 5-merous, white to red; stamens 10, included; anthers 2-awned at apex, opening by short slits; style slender, longer than stamens: caps. 5-valved; cells with 1–few, 3–5-angled or winged seeds. (Greek *egkyein* to be pregnant, and *anthos*, flower: the large colored involucre of *E. quinqueflorus* resembles a flower enclosing smaller fls.) Syn. *Enkyanthus* DC. About 10 species in E. Asia and Himal.

A. Corolla gibbous or saccate at base, urceolate, with reflexed lobes: fr. on straight pedicels.
  B. Fls. in umbels, before the lvs.: corolla about 8 mm. long. (Sect. Euenkianthus Palib.) 1. *E. perulatus*
  BB. Fls. in pendulous racemes after the lvs.; corolla 5 mm. long. (Sect. Andromedina Palib.) 2. *E. subsessilis*
AA. Corolla not gibbous at base, campanulate; fls. after the lvs.: fruiting pedicels recurved at apex.
  B. Corolla with 5 short lobes. (Sect. Enkiantella Palib.)
    C. Ovary and style glabrous ..... 3. *E. campanulatus*
    CC. Ovary and style pubescent ..... 4. *E. deflexus*
  BB. Corolla with irregularly laciniate limb. (Sect. Meisteria Palib.) ..... 5. *E. cernuus*

1. **E. perulàtus** Schneid. Shrub to 2 m.: lvs. elliptic-ovate to obovate, 2–5 cm. long, acute, sharply appressed-serrulate, glabrous and bright green above, pubescent on the veins beneath; petiole 8–13 mm. long: fls. in 3–10-fld. umbels, slender-pediceled, nodding; corolla white, urceolate, 8 mm. long; filaments pubescent below the middle; caps. oblong-ovoid, 8 mm. long. Fl.v. B.M.5822(c). S.I.2:t.62(c). G.C.III.21:357. Gn.87:607. N.T.1:147. (*E. japonicus* Hook. f., *Andromeda perulata* Miq.) Japan. Intr. about 1870. Zone V.—Attractive much-branched shrub with small white fls. before the lvs.; the foliage turning yellow and partly scarlet in autumn.

A related species is **E. serrulàtus** Schneid. Shrub to 6 m.: lvs. elliptic-oblong, 4 9 cm. long, acuminate, serrulate, glabrous, reticulate: fls. 3–5, white, campanulate with reflexed lobes, 10–12 mm. long. S.H.2:f.340h(l). (*E. quinqueflorus* var. *s.* Wils.) C. and W. China. Intr. 1900. Zone VI?—The closely related *E. quinqueflorus* Lour. with evergreen entire lvs. and pink fls. is probably not hardy within our area.

2. **E. subséssilis** Mak. Dense shrub to 3 m.: lvs. elliptic to rhombic-obovate, 2–4.5 cm. long, acute, serrulate, pale green beneath and pubescent along the midrib; petiole 2–5 mm. long: fls. in pendulous racemes 4–6 cm. long; rachis pubescent; pedicels glabrous, about 1 cm. long; corolla globose-urceolate, 5 mm. long, white: fr. ovoid, 4 mm. long, on straight pedicels. Fl.v. S.I.2:t.62(c). S.T.1:t.25. N.T.1:137. (*E. nikoensis* Mak., *Andromeda s.* Miq.) Japan. Intr. 1892. Zone V.—Less handsome in flower than the other species, but lvs. brilliant red in autumn.

3. **E. campanulàtus** Nichols. Shrub to 10 m.: lvs. elliptic to rhombic-elliptic, 3–7 cm. long, acute or acuminate, appressed-serrulate with aristate

teeth, with scattered bristly hairs above and on the veins beneath; petiole 8–15 mm. long: fls. in pendulous umbel-like racemes; pedicels to 2 cm. long, pubescent; corolla campanulate, 8–12 mm. long, yellowish or light orange, veined with red; sepals lanceolate; filaments short-pubescent: fr. oblong-ovoid, 5–7 mm. long, upright on the recurved pedicel. Fl.v. B.M.7059(c). S.I.2:t.62(c). Gt.22:t.747. Gn.75:287. B.S.1:512. N.T.1:138. (*Andromeda c.* Miq.) Japan. Cult. 1870. Zone V.—Var. **albiflòrus** Mak. Fls. white or nearly white. (*E. pallidiflorus* Craib.)—Var. **Palibìnii** Bean. Lvs. with rufous pubescence along the midrib, narrower: fls. red, about 8 mm. long; filaments villous. B.M.7059(c).) (?*E. rubicundus* Mats. & Nakai, *E. P.* Craib.)—Also *E. ferrugineus, E. latiflorus, E. pendulus, E. recurvus* and *E. tectus* Craib are only forms of this species.—Handsome shrub with graceful pendulous fls. of unusual color; the lvs. turning brilliant red in autumn.

4. **E. defléxus** Schneid. Shrub or small tree; brts. bright red, pubescent when young: lvs. elliptic or obovate to oblong-lanceolate, 2.5–7 cm. long, acute at ends, serrulate, strigose on midrib beneath and usually sparingly hairy on both sides: fls. in many-fld. umbel-like racemes; sepals triangular, acute; corolla broad-campanulate, 1.5 cm. broad, yellowish red with darker veins; filaments and anthers pubescent; style below the middle and ovary pubescent; caps. 6–8 mm. long or smaller. Fl.v. B.M.6460(c). (*E. himalaicus* Hook. f., *E. sulcatus* Craib.) Himal., W. China. Cult. 1878. Zone VIII?; the Chinese form hardier, intr. 1904.—Similar to the preceding species, but with larger and showier fls.

A related species is **E. chinénsis** Franch. Lvs. elliptic to elliptic-oblong, crenate-serrulate, glabrous or nearly so: infl. glabrous; fls. salmon-red. J.P.1900:212. (*E. himalaicus* var. *c.* Diels, *E. sinohimalaicus* Craib.) Intr. 1900. Zone VII?

5. **E. cérnuus** Mak. Shrub to 5 m.: lvs. elliptic to rhombic-obovate or obovate-oblong, 2–4 cm. long, acute or obtusish, crenate-serrulate, bright green above, sparingly pubescent on the midrib and often on the veins beneath; petiole 2–5 mm. long: fls. slender-pediceled, in 10–12-fld. pubescent racemes; corolla campanulate, 6–8 mm. long, with irregularly laciniate limb, white; sepals ovate-lanceolate, ciliate: caps. ellipsoid, 5 mm. long. Fl.v. N.T.1:144. S.H.2:f.340i-l,341s-t. (*Meisteria cernua* Sieb. & Zucc., *E. Meisteria* Maxim.) Japan. Cult. 1900. Zone V.—Var. **rubens** Mak. Fls. deep red; filaments long-villous. N.T.1:145. M.T.1:t.33. (*E. Matsudai* Komatsu.) —Handsome and graceful shrub, particularly the red-fld. form.

15. **CASSÍOPE** D. Don. Low evergreen shrubs; buds minute: lvs. scale-like and imbricated in 4 rows or linear and spreading: fls. solitary, axillary or terminal, nodding, usually 5-merous; calyx small, 4–5-parted, with ovate imbricate lobes; corolla campanulate 4–5-lobed or -cleft; stamens 8–10; filaments short; anthers with recurved awns on back, opening by apical pores; style short: caps. globose, 4–5-celled, loculicidal; seeds minute, wingless, smooth. (Cassiope, wife of Cepheus and mother of Andromeda.) About 12 species circumpolar and on Himal.—Interesting low evergreen shrubs with small white or pinkish fls. suited for the alpine rockery in a moist and half-shady situation.

A. Lvs. ovate to ovate-oblong, imbricate in 4 rows: fls. axillary ..... 1. *C. tetragona*
AA. Lvs. linear-subulate, spreading: fls. terminal ..... 2. *C. hypnoides*

1. **C. tetragòna** D. Don. Upright or ascending shrub to 30 cm.: lvs. 4 mm. long, densely covering the stem and giving it a 4-angled shape, finely pubescent and ciliate, furrowed on back: corolla open-campanulate, 5–6 mm. wide, with short broad lobes, white tinged with pink; sepals ovate; pedicels

glabrous. Fl.v. B.M.3181(c). E.P.IV.1:22,f.12D. M.G.25:125, 127(h). S.L. 135(h). (*Andromeda t.* L.) Circumpolar species, in N. Am. s. to Ore. Intr. 1810. Zone I.

Related species are: **C. Mertensiàna** D. Don. Erect or ascending: lvs. less closely appressed, glabrous, without furrow on back; corolla 6–8 mm. wide. Henshaw, Mtn. Fl. Am.t.25. Brown & Schaeffer, Alp. Pl. Can.216,t(c). Alaska to Calif. Intr. about 1885. Zone V.—**C. fastigiàta** D. Don. Upright: lvs. with membranous, silvery-white margin and ciliolate, furrowed on back: fls. 8–10 mm. wide, white on puberulous pedicels. B.M.4796(c). E.N.IV.1:22,f.12F. G.C.III.47: 379(h). (*Andromeda f.* Wall.) Himal. Intr. about 1849. Zone VI or VII?—**C. selaginoìdes** Hook. Dwarf, usually prostrate shrub, to 25 cm. high: lvs. 4-ranked, lanceolate to oblong-lanceolate, 2–3 mm. long, bristle-tipped, cordate at base, furrowed on back, slightly ciliate: corolla globose-campanulate, 7–10 mm. long; pedicels 5–15 mm. long, pubescent. B.M.9003B(c). Himal. Intr. 1920.

2. **C. hypnoìdes** D. Don. Prostrate shrub; the slender stems densely covered with spreading linear lvs. about 3 mm. long and minutely puberulous: fls. on slender stalks 8–20 mm. long; corolla open-campanulate, 5–6 mm. long, deeply lobed, wide; sepals red. Fl.VI–VII. B.M.2936(c). L.B.1946(c). G.C.III.39:226(h). E.N.IV.1:22,f.12J. B.B.2:686. (*Andromeda h.* L., *Harrimanella h.* Cov.) Circumpolar species in Am. s. to N. H. and N. Y. Intr. 1798. Zone I.

16. **ANDRÓMEDA** L. Evergreen low shrubs with subterete brs.; winter-buds small, with 2 outer scales; lvs. short-petioled, narrow, entire: fls. in terminal umbels, nodding; calyx small, 5-lobed: corolla globose-urceolate, with 5 short recurved lobes; stamens 10, included; anthers with 2 slender ascending awns, opening by apical pores: caps. subglobose, 5-valved, loculicidal, the sutures not thickened; seeds oval, smooth. (Andromeda, daughter of Cepheus and Cassiope.) Two species in the colder parts of the n. hemisphere.—Low evergreen shrubs with attractive light pink fls.; the first species more graceful.

A. Lvs. glabrous beneath: pedicels 1–2 cm. long ..... 1. *A. Polifolia*
AA. Lvs. white-tomentulose beneath: pedicels less than 1 cm. long ..... 2. *A. glaucophylla*

1. **A. Polifòlia** L. Shrub to 0.3, rarely to 0.8 m. tall, with creeping rootstock and upright usually little-branched stems: lvs. oblong to linear, 1.5–3.5 cm. long, usually acute, revolute, glaucous beneath, often becoming green; pedicels 2–4 times as long as corolla; calyx usually reddish; corolla 6–7 mm. long, white to pink; caps. subglobose to obovoid. Fl.v–VII. L.B.1714(c). R.I.17:110,f.1(c). F.D.20:t.2034(c). Gn.88:208(h). G.W.12:50(h). S.L. 56(h). N. and C. Eu., N. Asia; in N. Am. s. to N. Y., Lake Huron, Idaho. Cult. 1768. Zone I.

2. **A. glaucophýlla** Link. Similar to the preceding; brts. and winter-buds glaucous: lvs. usually linear, white-tomentulose beneath: fls. in rather dense clusters, on curved pedicels not more than twice as long as corolla; calyx whitish; caps. depressed-globose, glaucous. Fl.v–VII. L.B.1591(c),1725(c). Gr.M.635. (*A. canescens* Small, *A. Polifolia* Auth., *A. Polifolia* var. *angustifolia* Ait. and var. *revoluta* Lodd.) Nfdl. and Lab. to Manitoba, s. to N. J., Ind. and Minn. Cult. 1879. Zone I.—Var. **latifòlia** Rehd. Lvs. narrow-oblong to oblong. L.B.546(c). (*A. Polifolia* var. *l.* Ait.)

17. **ZENÓBIA** D. Don. Deciduous or half-evergreen shrub; buds ovoid, obtuse, with several outer scales: lvs. alternate, short-petioled, crenulate or entire: fls. in axillary clusters, forming racemes on the upper part of last year's brs.; calyx-lobes 5, valvate; corolla campanulate, obtusely 5-lobed; stamens 10; anthers with 4 terminal slender awns, opening by pores; disk

10-lobed; style about as long as corolla: caps. subglobose, 5-valved, with thickened suture, loculicidal; seeds numerous, small, angled. (Zenobia, queen of Palmyra.) One species in E. N. Am.

Z. pulverulénta Pollard. Shrub to 2 m., glabrous, with upright or arching terete brs.: lvs. oval to oblong, 2–7 cm. long, obtuse or acutish, glabrous and covered more or less with glaucous bloom: fls. on slender nodding pedicels 1–2 cm. long; corolla white, 6–8 mm. long; sepals ovate or triangular-ovate; caps. 6–7 mm. across. Fl.v–vi. B.M.667(c). L.B.551(c). Gn.24:572,t(c); 81:19;86:656. G.C.III.7:612;23:328,f.119(h). (*Z. speciosa* D. Don, *Andromeda p.* Bartr., *A. dealbata* Lindl., *A. glauca* and *A. candida* Hort.) N. C. to Fla. Intr. 1801. Zone V.—Var. **nûda** Rehd. Lvs. green, without bloom; fls. and caps. somewhat smaller. Gn.86:656. B.M.970(c). S.B.II.t.330(c). (*Z. cassinifolia* Pollard, *Andromeda cassinifolia* Vent., *A. wilmingtonia* Michx., *A. speciosa* var. *nitida* Michx., *A. speciosa* var. *viridis* Hort.) Occurs with the type.—Handsome shrub with conspicuous white fls. and striking bluish white foliage in its typical form.

18. **PÍERIS** D. Don. Evergreen shrubs or small trees; winter-buds ovoid with several outer scales: lvs. alternate, rarely opposite, petioled, serrate to crenulate, rarely entire: fls. in terminal panicles, rarely reduced to small racemes; calyx-lobes separate; corolla ovoid-urceolate, with 5 short lobes; stamens 10, included; anthers with a pair of reflexed awns on back: caps. subglobose, usually depressed, 5-valved, the sutures not thickened, loculicidal; seeds small, scobiform. (Pieris, Greek mythological name.) Syn. *Portuna* Nutt. About 8 species in N. Am., E. Asia and Himal.

A. Brts. strigose: panicles upright.....1. *P. floribunda*
AA. Brts. glabrous; panicles drooping.....2. *P. japonica*

1. **P. floribúnda** Benth. & Hook. Shrub with erect stems to 2 m.: lvs. elliptic-ovate to oblong-lanceolate, 3–8 cm. long, acute or short-acuminate, obtuse at base, crenate-serrulate and ciliate, otherwise glabrous; fls. nodding in dense panicles 5–10 cm. long; calyx-lobes ovate; corolla angled, 5–6 mm. long; caps. globose-ovoid, 5–6 mm. long, slightly angled. Fl.iv–v. B.M. 1566(c). Add. 5:t.163(c). Gn.31:612;86:222(h). G.C.III.45:408(h). S.L. 56(h). (*Andromeda f.* Pursh, *Portuna f.* Nutt.) Va. to Ga. Intr. 1800. Zone V.—Dense evergreen shrub valued for its early profuse white fls.

2. **P. japónica** D. Don. Shrub to 3 m., with spreading brs.; lvs. obovate-oblong to oblanceolate, 3–8 cm. long, crenate-serrate, lustrous dark green above, lighter green beneath, glabrous: fls. in pendulous panicles, 6–12 cm. long, calyx-lobes oblong-lanceolate; corolla ovoid, 6–8 mm. long; caps. depressed-globose, 5–6 mm. across. Fl.iv–v. S.I.1:t.78(c). R.B.11:109(c). B.H.21:272,t(c). Gn.12:98,t(c);50:307(h);57:399(h). B.S.2:167. G.W.9:354 (h). (*Andromeda j.* Thunb.) Japan. Cult. 1870. Zone (V), VI.—Handsome shrub with lustrous foliage, very beautiful and graceful in bloom.—Var. **variegàta** Bean. Lvs. smaller, with whitish margin. Yatabe Icon. Fl. Jap. 1:t.30a(c). (*P. j.* var. *albo-marginata* Rehd., *Andromeda j. variegata* Carr.) Cult. 1880.—Var. **pygmaèa** Rehd. Dwarf form with smaller narrow-oblanceolate lvs. Yatabe, Icon. Fl. Jap. 1:t.30b(c). (*Andromeda j.* var. *p.* Maxim.)

Related species are: **P. formòsa** D. Don. Shrub or small tree to 6 m.: lvs. elliptic-oblong to lanceolate, 6–15 cm. long, acuminate, broad-cuneate, serrulate: fls. white or tinged with pink, in drooping panicles to 15 cm. long. B.M.8283(c). I.H.5:t.162(c). G.C.II.15:569. Gn.54:77;81:408(h). E. Himal. Cult. 1858. Zone VIII?—**P. Forréstii** Harrow. Upright shrub with pendent brs.; young growth red: lvs. oblong-lanceolate or oblanceolate, 6–12 cm. long, serrulate: pedicels 5 mm.

long; sepals whitish; corolla urceolate, 9 mm. long, with narrow 5-angled mouth and upright lobes; filaments sparingly pilose; style as long as corolla. G.35:266. G.C.III.75:339. S. W. China. Intr. about 1910.

A very distinct species is **P. nãna** Mak. Prostrate shrub; brts. puberulous: lvs. usually in whorls of 3, elliptic to elliptic-oblong, 5–10 mm. long, mucronulate, entire, very coriaceous: fls. terminal, in 3's or in short racemes; corolla globose-urceolate, 4 mm. long, white. N.T.1:122. G.C.III.75:217(h). (*Arcteria n.* Mak., *A. oxycoccoides* Cov., *Andromeda n.* Maxim.) N. E. Asia. Intr. 1915. Zone V or I?—*P. phillyriaefolia* DC. (*Ampelothamnus phillyriaefolius* Small) from Ga. to Fla. is probably not hardy within our area.

19. **XOLÍSMA** Raf. Evergreen or deciduous shrubs, rarely small trees; brs. angled or terete; winter-buds ovoid, with 2 or several outer scales: lvs. alternate, short-petioled, entire or shallowly toothed or serrulate, sometimes lepidote: fls. in axillary clusters or racemes or collected into terminal panicles; calyx 5-, rarely 4–8-lobed, with separated lobes; corolla urceolate or cylindric-campanulate, with short lobes; stamens 10, rarely 8–16; filaments with a pair of appendages near apex or without; anthers obtuse, without appendages, opening by apical pores; caps. subglobose or ovoid with thickened sutures; seeds small, scobiform. (Name of unknown meaning.) Syn. *Lyonia* Nutt., not Ell., nor Raf. About 30 species in N. Am., W. Ind. and E. Asia and Himal.

A. Fls. in terminal panicles: lvs. deciduous, entire or serrulate.....**1.** *X. ligustrina*
AA. Fls. in axillary clusters or racemes: lvs. entire.
B. Brts. angled: lvs. persistent; corolla conic-ovoid.....2. *X. lucida*
BB. Brts. terete: lvs. deciduous or half-evergreen; corolla cylindric-ovoid.
C. Fls. in axillary fascicles: lvs. obtuse or acute, cuneate.....3. *X. mariana*
CC. Fls. in axillary racemes: lvs. acuminate or acute, rounded at base,...4. *X. ovalifolia*

1. X. ligustrìna Britt. MALE-BERRY. Deciduous much-branched shrub to 4 m., glabrous or somewhat pubescent: lvs. short-petioled, elliptic or obovate to oblong-lanceolate, 3–7 cm. long, usually acute, or abruptly acuminate, entire or obscurely serrulate, pubescent on the veins beneath or glabrous: fls. in leafless racemes forming dense terminal panicles 6–15 cm. long; calyx-lobes triangular-ovate; corolla globose- or ovoid-urceolate, puberulous, 3–4 mm. long; filaments flat, without appendages: caps. subglobose 3 mm. across. Fl.v–vii. L.B.1110(c). W.D.t.37,38, 127, 128(c). B.B.2:691. (*Andromeda l.* Muhlb., *A. paniculata* Ait., *Lyonia l.* DC. *Arsenococcus ligustrinus* Small.) Canada to Fla., w. to Tenn. and Tex. Intr. 1748. Zone IV.—Var. **pubéscens** Millsp. Lvs. appressed-pubescent above, villous on the veins beneath and loosely pubescent on the surface, thickish, reticulate, entire or nearly so: infl. slightly leafy; corolla short-villous. (*Andromeda tomentosa* Dum.-Cours., *A. ligustrina* var. *p.* Gray.) Cult. 1810.—Var. **foliosiflòra** C. Mohr. Racemes less crowded, often elongated, conspicuously leafy-bracted: lvs. leathery, serrulate, usually lustrous above. (*X. frondosa* Small, *A. paniculata* var. *foliosiflora* Michx.) Va. to Fla. and La. Intr.?—Deciduous shrub of slight ornamental value except for its late fls.

2. X. lùcida Rehd. FETTER-BUSH. Evergreen shrub to 2 m. with sharply angled brs.; glabrous: lvs. broad-elliptic or obovate to oblong, 3–8 cm. long, abruptly acuminate, cuneate, entire, revolute, with a vein close to the margin, bright green and lustrous above: fls. in axillary clusters forming terminal leafy racemes; calyx-lobes lanceolate; corolla conic-ovoid, 6–8 mm. long,, white to pink; filaments glabrous, with a pair of appendages near apex: caps. globose-ovoid, 4 mm. long. Fl.iv–v. B.M.1095(c). B.B.2:690. (*Andromeda l.* Lam., *A. nitida* Bartr., *Lyonia n.* Fern., *Pieris l.* Rehd., not Lév., *Desmothamnus lucidus* Small.) Va. to Fla. and La. Intr. 1765. Zone VII or VIII?

—Var. **rúbra** Rehd. Fls. deep pink. L.B.672(c). (*Andromeda coriacea rubra* Lodd.)—Handsome shrub with lustrous evergreen foliage.

Another evergreen species is **X. ferrugínea** A. Heller (*Andromeda f.* Walt.) with the brts. and the lvs. beneath red-scurfy, from S. C. to Fla. and probably not hardy within our area.

3. **X. mariàna** Rehd. Stagger-bush. Deciduous shrub to 2 m., glabrous or nearly so: lvs. elliptic to oblong, 3–6 cm. long, acute or obtuse, cuneate, entire, subcoriaceous and somewhat reticulate: fls. nodding, in axillary clusters forming terminal leafless racemes; calyx-lobes lanceolate; corolla cylindric-ovoid, about 1 cm. long, white or pinkish; filaments pubescent, with a pair of appendages near apex: caps. ovoid-pyramidal, 7–9 mm. long, about as long as sepals. Fl.v–vi. B.M.1579(c). M.N.2:t.47(c). G.O.t.113(c). A.G. 10:281. B.C.5:2623. (*Andromeda m.* L., *Pieris m.* Benth. & Hook., *Lyonia m.* D. Don.) R. I. to Fla., w. to Tenn. and Ark. Intr. 1736. Zone V.—Very handsome with its profusely produced white or pinkish fls.

4. **X. ovalifòlia** Rehd. Half-evergreen or deciduous shrub or tree to 12 m.; brts. glabrous: lvs. ovate or elliptic to ovate-oblong, 5–14 cm. long, short-acuminate, or acute, usually rounded at base, entire, glabrous or hairy on the veins beneath, subcoriaceous: fls. in lateral racemes, 5–14 cm. long, with a few lvs. or leafy bracts near base; sepals ovate or triangular-lanceolate; corolla oblong-urceolate, 8 mm. long, slightly pubescent; caps. 4–5 mm. across. Fl.v–vi. Wight, Icon. 1199. L.A.2:1115. (*Andromeda o.* Wall., *Pieris o.* D. Don, *Lyonia o.* Drude.) Himal., S. W. China. Intr. 1825. Zone VII or VIII. Doubtful if at present in cult.—Var. **lanceolàta** Rehd. Lvs. elliptic-oblong to oblong-lanceolate, cuneate or broad-cuneate, rarely rounded at base; sepals narrower, greenish. Wight, Icon.t.1198. (*Pieris o.* var. *l.* Clarke.) Himal., W. China. Intr. 1908.—Var. **ellíptica** Rehd. Lvs. deciduous, thinner; caps. 3–4 mm. across; racemes generally shorter. S.I.2: t.60(c). N.T.1:150. S.H.2:f.346p-r,347e-g. (*Andromeda e.* Sieb. & Zucc., *Pieris o.* var. *e.* Rehd. & Wils., *P. e.* Nakai.) China, Japan. Intr. 1892. Zone VI or VII?—Handsome shrub similar in bloom to *Leucothoe racemosa.*

20. **CHAMAEDÁPHNE** Moench. Low evergreen shrub, buds small, with several outer scales: lvs. alternate, short-petioled, scurfy, especially beneath, obscurely toothed or nearly entire, more or less appressed to the stem: fls. nodding, short-pediceled, in terminal leafy racemes; calyx small, 5-lobed, subtended by two bractlets: corolla oblong-urceolate, with 5 short lobes; stamens 10, included; anther-sacs terminating into an elongated tube opening by a terminal pore: caps. depressed-globose, with thickened sutures; the wall splitting into 2 layers, the inner one 10-valved; seeds small wingless. (Greek *chamai*, on the ground, and *daphne*, laurel; alluding to the low habit and evergreen lvs.) One circumpolar species.

C. calyculàta Moench. Upright shrub with spreading or horizontal brs., to 1.5 m.: lvs. elliptic or obovate to oblong or lanceolate, 1–5 cm. long, obtuse or acute, revolute, dull green and slightly scaly above, densely so beneath, racemes 4–12 cm. long; corolla 6–7 mm. long, white; caps. 4 mm. across. Fl. iv–vi. B.M.1286(c). L.B.530,1464,1582(c). M.N.1:125,t(c). R.I.17:t.110, f.2(c). (*Andromeda c.* L., *Cassandra c.* D. Don, *Lyonia c.* Reichenb.) N. Eu., N. Asia; in N. Am. s. to Ga., Ill. and B. C. Cult. 1748. Zone I.—Var. **angustifòlia** Rehd. Lvs. linear-lanceolate, wavy on the margin. (*Andromeda c.* var. *a.* Ait.)—Var. **nàna** Rehd. Low, not exceeding 30 cm., with horizontal brs. and smaller lvs. L.B.862(c). (*Andromeda c.* var. *n.* Lodd., *A. vaccinioides* Hort.) Cult. 1820.

21. **OXYDÉNDRON** DC. Deciduous tree; winter-buds small, with about 3 outer scales: lvs. alternate, petioled, serrulate: fls. whitish, in terminal panicles of 6 or more slender one-sided racemes; calyx deeply divided into 5 separated lobes; corolla cylindric-ovoid, puberulous, with 5 short lobes; stamens 10; anthers linear-oblong, awnless, opening from the apex to the middle; style slightly exserted; caps. ovoid-pyramidal, slightly angled, 5-valved, loculicidal; seeds numerous, the loose reticulate seed-coat slender-pointed at ends. (Greek *oxys*, sour, and *dendron*, tree, referring to the acid taste of the lvs.) One species in N. Am.

O. arbóreum DC. Sorrel-tree. Tree, sometimes to 25 m. tall; bark deeply fissured; brts. glabrous or sparingly puberulous: lvs. slender-petioled, elliptic-oblong to oblong-lanceolate, 8–20 cm. long, acuminate, broad-cuneate, serrulate, lustrous above, glabrous, sparingly pubescent on veins beneath; petiole 8–15 mm. long, slender: panicles 10–25 cm. long, drooping; corolla 6–8 mm. long: caps. 5 mm. long, grayish pubescent. Fl.VII–VIII; fr.IX–X. Add.4:t.139(c). B.M.905(c). L.B.1210(c). S.S.5:t.235. F.E.24:131(h). M. G.19:253(h). (*Andromeda arborea* L.—Sour-wood.) Pa. to Fla., w. to Ind. and La. Intr. 1752. Zone V.—Handsome summer-flowering tree, with large lustrous lvs. turning scarlet in autumn, but remaining pale beneath; also the light gray fruits are conspicuous.

22. **LEUCÓTHOË** D. Don. Evergreen or deciduous shrubs; winter-buds small, roundish with several outer scales: lvs. alternate, short-petioled, serrulate: fls. in axillary or terminal racemes or panicles; corolla ovoid or cylindric; anthers obtuse or 2- or 4-awned; caps. subglobose, 5-lobed, loculicidal, the sutures not thickened; seeds pendulous, scobiform. (Leucothoe, daughter of the mythological king Orchamus.) Including *Eubotrys* Nutt. and *Agarista* D. Don.) About 35 species in N. and S. Am., Madag., Himal. and Japan.

A. Anthers awnless; lvs. evergreen or half-evergreen; calyx without bractlets at base. (Subgen. EU-LEUCOTHOE Drude.)
  B. Fls. in axillary dense racemes; filaments pubescent.
    C. Lvs. long-acuminate, closely serrulate; petiole 1–1.5 cm. long ..... 1. *L. Catesbaei*
    CC. Lvs. abruptly acuminate, remotely serrulate; petiole 5–10 mm. long ... 2. *L. axillaris*
  BB. Fls. in terminal upright panicles or racemes.
    C. Lvs. glabrous, distinctly petioled, serrulate toward the apex, evergreen: racemes usually panicled ..... 3. *L. Davisiae*
    CC. Lvs. ciliate and more or less pilose, subsessile, entire, usually half-evergreen: racemes usually solitary ..... 4. *L. Grayana*
AA. Anthers awned; racemes or panicles terminal on short brts.; calyx with 2 bractlets at base: lvs. deciduous. (Subgen. EUBOTRYS Gray.)
  B. Panicles nearly straight; anthers with 4 awns ..... 5. *L. racemosa*
  BB. Panicles recurved; anthers with 2 awns ..... 6. *L. recurva*

1. **L. Catesbaèi** Gray. Evergreen shrub to 2 m., with spreading and arching brs. reddish and puberulous when young: lvs. ovate-lanceolate to lanceolate, 6–15 cm. long, long-acuminate, rounded or broad-cuneate at base, appressed ciliate-serrulate, lustrous dark green above, lighter beneath, glabrous: racemes 4–7 cm. long; sepals oblong-ovate, scarcely imbricate: corolla cylindric-ovoid, about 6 mm. long, white, usually reddish in bud: caps. depressed-globose, 4–5 mm. across. Fl.IV–V. Add. 4:t.151(c). B.M.1955(c). L.B.1320(c). Gn.M.2:18. G.W.6:279(h). (*Andromeda C.* Walt.) Va. to Ga. and Tenn. Intr. 1793. Zone V.—Var. **Rollissònii** Bean. Lvs. smaller and narrower, 5–10 cm. long and 1–1.8 cm. wide.—Very handsome evergreen shrub with rather large lustrous lvs.

2. **L. axillàris** D. Don. Evergreen shrub to 2 m., with arching brs. puberulous when young: lvs. elliptic to oblong-lanceolate, 5–10 cm. long, abruptly short-acuminate or acute, remotely serrulate, often entire toward the base,

lustrous above, sparingly pubescent beneath when young; racemes 2–7 cm. long; pedicels very short; sepals ovate, imbricate; corolla cylindric-ovoid, 6–7 mm. long, white, greenish in bud. Fl.IV–V. G.O.114(c). B.B.2:687. (*Andromeda a.* Lam.) Va. to Fla. and Miss. Intr. 1765. Zone VI or VII?—Similar to the preceding, but less hardy.

A related species is **L. populifòlia** Dipp. Shrub to 4 m.; brts. with lamellate pith: lvs. ovate-lanceolate, 3–10 cm. long, acuminate, entire or obscurely serrulate: racemes peduncled, few-fld.; pedicels slender; corolla 8–10 mm. long. Smith, Exot. Bot.t.89(c). S.H.2:f.345h-k,346k. (*Andromeda p.* Lam., *A. lucida* Jacq., not Lam., *A. acuminata* Ait., *L. acuminata* G. Don.) S. C. to Fla. Intr. 1765. Zone VIII?

3. **L. Davísiae** Torr. Evergreen upright shrub to 1 m.; brts. glabrous: lvs. short-petioled, ovate-oblong to oval, 2–7 cm. long, obtuse to acute, entire or slightly toothed, lustrous dark green, glabrous: fls. nodding, in terminal upright panicles 6–10 cm. long; sepals ovate; corolla urceolate, 6–8 mm. long; pedicels short: caps. 5–6 mm. across. Fl.VI. B.M.6247(c). B.S.2:20. Gn.86:222. (*Andromeda D.* Schneid., *Oreocallis D.* Small.) Ore. to Calif. Intr. 1853. Zone (V).—Handsome shrub with conspicuous panicles of white fls.

A related species is **L. Keìskei** Miq. Slender shrub; lvs. ovate to ovate-oblong, 3.5–8 cm. long, long-acuminate, broad-cuneate or rounded, remotely and indistinctly crenate-serrate, glabrous; petiole 2–4 mm. long: racemes terminal and axillary at end of brs., short, to 4 cm. long; pedicels slender about 1 cm. long, nodding; corolla cylindric, 1.5 cm. long, white. N.T.1:128. M.I.1:t.34. Japan. Intr. 1915. Zone V.—Graceful shrub with rather large white pendulous fls.

4. **L. Grayàna** Maxim. Half-evergreen shrub to 1 m., with stout upright glabrous brs.: lvs. subsessile, broad-elliptic or obovate to oblong-ovate or -obovate, 5–8 cm. long, acute or short-acuminate, rounded at base, ciliate, otherwise nearly glabrous or slightly pilose, often rugose above: fls. in terminal racemes 5–10 cm. long, leafy at base; upper bracts linear-lanceolate or subulate, longer than the short pedicels; sepals ovate to ovate-lanceolate, glandular-ciliate: corolla urceolate-campanulate, 4–5 mm. long, greenish white to pinkish: ovary glabrous or pubescent (var. *Tschonoskii* Takeda): caps. depressed-globose, 4–5 mm. across. Fl.VII–IX. N.T.1:131–3. N. and C. Japan. Intr. 1890. Zone V.

5. **L. racemòsa** Gray. Deciduous upright shrub to 4 m.: lvs. short-petioled, oblong to elliptic, 2–7 cm. long, acute, serrulate, pubescent beneath, at least on the veins: fls. in upright or spreading racemes, 5–10 cm. long; sepals triangular-ovate to triangular-lanceolate; corolla cylindric, 8–9 mm. long, white or pinkish; caps. subglobose, 4 mm. broad; seeds wingless. Fl. V–VI. G.O.t.57(c). Em.423,t. B.S.2:21. B.B.2:689. (*Andromeda r.* Lam., *Lyonia r.* Don, *Eubotrys r.* Nutt.) Mass. to Fla. and La. Intr. 1736. Zone V.—Handsome shrub with bright green lvs. turning scarlet in autumn and with slender racemes of white fls. in spring.

6. **L. recúrva** Gray. Deciduous spreading shrub, to 4 m.: lvs. short-petioled, elliptic-ovate or obovate to elliptic-lanceolate, 4–10 cm. long, acute or short-acuminate, serrulate, pubescent on the veins beneath or nearly glabrous: racemes spreading and curved, 2–10 cm. long; sepals ovate to oblong-ovate; corolla cylindric, 6–8 mm. long; anthers with 2 awns: caps. subglobose, 5–6 mm. broad; seeds winged. Fl.IV–VI. G.F.9:225. B.C.4:1850. I.T.1:t.40. B.B.2:688. (*Andromeda r.* Buckl., *Eubotrys r.* Britt.) Va. to Ga. and Ala. Cult. 1880. Zone V.—Similar to the preceding species.

23. **EPIGAÈA** L. Prostrate evergreen shrub with creeping stems: lvs. alternate, petioled: fls. perfect or dioecious, in short terminal and axillary

bracted spikes; pedicels with 2 bractlets; sepals 5, imbricate, large, green: corolla salverform, with 5 spreading lobes; stamens 10, included; filaments adnate to base of corolla; anthers opening by slits; stigma 5-lobed; ovary hairy: caps. depressed-globose, fleshy, hirsute, 5-valved, loculicidal; seeds minute on a white succulent placenta. (Greek *epi*, on, and *gaea*, earth; in allusion to the creeping habit.) Two species in N. Am. and Japan.

E. rèpens L. Mayflower. Stems hirsute, to 30 cm. long: lvs. ovate or suborbicular to oblong-ovate, 2–8 cm. long, rounded and apiculate or acute at apex, subcordate or rounded at base, ciliate, sparingly hairy on both sides or nearly glabrous; petiole 5–30 mm. long: fls. white to pink, very fragrant; sepals ovate to lanceolate, acuminate, 5–8 mm. long; corolla-tube about 1.5 cm. long; staminate fls. larger: caps. berry-like after dehiscence, 8–9 mm. across, whitish. Fl.IV–V. L.B.160(c). B.R.201(c). Em.431,t(c). Gd.W.t. 37(c). M.M.3:t.2(c). G.C.III.42:343(h). (Trailing Arbutus.) Nfdl. to Sask., s. to Fla., Ky. and Mich. Intr. 1736. Zone I.—Creeping plant with rather large bright green lvs. and white to pink sweetly fragrant fls. Rarely seen in cult.

The closely related **E. asiática** Maxim. with mostly oblong-ovate acuminate or acute lvs. from Japan (N.T.1:126. M.I.1:t.28) is apparently not in cult.

A related genus is **Orphanidèsia** Boiss. Procumbent evergreen shrub with large hirsute ovate-oblong lvs.: fls. 1–2, axillary, salver-shaped; anthers with apical pores: caps. subglobose. One species, **O. gaultherioìdes** Boiss. in Asia Minor (Lazistan). Gt.40:469. Intr. about 1885. Zone VI? Apparently not now in cult.

Tribe 3. Gaultherieae Niedenz. Fr. a loculicidal caps. surrounded by the accrescent fleshy calyx and berry-like: corolla deciduous.

24. **GAULTHÈRIA** L. Evergreen, upright or prostrate shrubs, rarely small trees: winter-buds ovoid, with several outer scales: lvs. alternate, rarely opposite, short-petioled, usually serrate: fls. in terminal panicles or axillary, racemose, clustered or solitary; pedicels bracteolate; calyx 5-parted, accrescent and becoming fleshy: corolla urceolate, or campanulate; stamens 10; anthers with 2 or 4 awns or obtuse; disk 10-lobed; ovary glabrous: fr. a 5-valved caps. enclosed by the fleshy calyx and often highly colored, berry-like; seeds numerous, minute. (After Dr. Gaultier, a physician in Quebec, about 1750.)—Handsome low evergreen shrubs more conspicuous in fr. than in bloom and mostly succeeding best in the rock garden.

A. Fls. in few- to many-fld. racemes.
  B. Racemes many-fld.: lvs. 4–10 cm. long.
    C. Lvs. subcordate to rounded at base, usually ovate; pedicels about as long as corolla. 1. *G. shallon*
    CC. Lvs. broad-cuneate to rounded at base, usually oblong: pedicels much shorter than corolla. 2. *G. Veitchiana*
  BB. Racemes 2–5-fld.: lvs. 1.5–3.5 cm. long. 3. *G. Miqueliana*
AA. Fls. solitary and axillary, rarely terminal.
  B. Corolla urceolate, short-lobed; anthers awned. 4. *G. procumbens*
  BB. Corolla campanulate, deeply lobed; anthers awnless. 5. *G. humifusa*

1. **G. shállon** Pursh. Shallon. Diffuse shrub with upright and ascending stems, to 0.5 m.; brts. glandular-hirsute: lvs. ovate to orbicular-ovate, 5–12 cm. long, acute or short-acuminate, rounded to cordate at base, serrulate, glabrous at maturity; petiole 3–6 mm. long: racemes slender, 5–12 cm. long, in terminal panicles, glandular-pubescent; bracts ovate or ovate-oblong; calyx-lobes triangular, whitish, pubescent; corolla ovoid, about 1 cm. long, white to pink, pubescent: fr. purple, becoming black, about 1 cm. across, hairy. Fl.V–VI; fr.IX–X. B.M.2843(c). B.R.1411(c). L.B.1372(c). Gn.31: 379. S.L.211(h). M.G.30:112(h). Alaska and B. C. to S. Calif. Intr. 1826. Zone (VI).—Handsome shrub adapted for borders of evergreen plantations.

2. **G. Veitchiàna** Craib. Shrub to 1 m., sometimes decumbent; brts. hispid: lvs. elliptic to oblong or oblong-obovate, 4–8 cm. long, abruptly mucronate, broad-cuneate to rounded, setose-serrulate, lustrous dark green and wrinkled above, lighter beneath and at first densely, later sparingly setose on the veins; petiole 2–3 mm. long: fls. nodding, in axillary and terminal dense racemes 2.5–5 cm. long, villous and closely bracteate, corolla ovoid, 4–6 mm. long: fr. about 6 mm. across, indigo-blue. Fl.v–vi; fr.viii–ix. B.S.1:582. W. China. Intr. 1908. Zone VII?—Handsome shrub with conspicuous blue fr.

3. **G. Miqueliàna** Nakai. Low shrub to 30 cm.; young brts. pubescent; lvs. crowded at end of brts., obovate or broad-elliptic, 1.5–3.5 cm. long, 1–2 cm. broad, rounded to acutish at apex, broad-cuneate to rounded at base, crenate-serrulate: fls. nodding in peduncled bracted and pubescent racemes 2–6 cm. long, one to several at end of brs.; pedicels about as long as corolla, much exceeding the ovate bracts; corolla globose-ovoid, 6 mm. long, white; style as long as corolla; ovary glabrous; fr. about 6 mm. across, white, sometimes pinkish. Fl.vi–vii; fr.ix–x. N.T.1:162. (*G. pyroloides* Miq., in part.) Japan. Intr. 1892. Zone V.—Handsome low evergreen shrub with conspicuous white fls. followed by white frs.

Related species are: **G. cuneàta** Bean. Lvs. scattered, elliptic-obovate to oblong-obovate, 6–12 mm. broad, acute, cuneate; ovary pubescent; fr. white. B.M.8829(c). G.C.III.76:161. (*G. pyroloides* var. *c.* Rehd. & Wils.) W. China. Intr. 1908. Zone (V).—**G. pyrolaefòlia** Hook. f. Lvs. scattered, broad-obovate to orbicular: style much shorter than corolla: fr. blue-black. (*G. pyroloides* Miq., in part.) Himal. Apparently not in cult.

4. **G. procúmbens** L. Checkerberry. Stems creeping, subterranean, with upright usually simple brs. to 15 cm., glabrous or puberulous, leafy at the top: lvs. oval or obovate, rarely suborbicular, 1.5–4 cm. long, obtuse and apiculate, crenate-serrate with often bristly teeth, lustrous bright green above, often variegated, glabrous; petiole about 4 mm. long: fls. nodding, on pedicels 4–8 mm. long, solitary; corolla ovoid, 6–7 mm. long; filaments villous: fr. subglobose, 8–10 mm. across, scarlet. Fl.v–ix; fr.viii–iv. B.M. 1966(c). L.B.82(c). A.R.t.116(c). Gn.31:379. (Aromatic Wintergreen, Partridge Berry, Box-berry.) Nfdl. to Man., s. to Ga. and Mich. Intr. 1762. Zone II?

Other species with solitary fls. and awned anthers, but with bristly stems are: **G. nummularioìdes** D. Don. Lvs. 2-ranked, suborbicular to broad-ovate, 6–15 mm. long, ciliate, bristly beneath, dull green and wrinkled above: fls. ovoid, white or pinkish, 5 mm. long: fr. blue-black. Royle, Ill.t.63,f.2(c). G.C.II.22:457. P.F.2:164. (*G. nummulariae* DC.) Himal. Intr. about 1850. Zone VII or VIII? —**G. trichophýlla** Royle. Lvs. crowded, elliptic-oblong to oblong, 5–10 mm. long, acute, ciliate, otherwise glabrous, lustrous above: fls. nearly campanulate, 4 mm. long, pink: fr. blue. Royle, Ill.t.63,f.3(c). S.H.2:f.350o,351m-n. Himal., W. China. Intr. 1897. Zone VII?

5. **G. humifùsa** Rydb. Cespitose shrub, to 10 cm., glabrous or nearly so: lvs. very short-petioled, suborbicular or oval, 1–2 cm. long, rounded to acutish at apex, entire or obscurely toothed: fls. short-stalked: corolla campanulate, 4 mm. long, slightly longer than calyx, the lobes ovate, as long as tube; corolla campanulate, about 5 mm. long; anthers obtuse: fr. scarlet, 6–7 mm. across. Fl.vii; fr.viii–ix. Hooker, Fl. Bor. Am. t.129. D.H.1:351. S.H.2:f.350n,351g-k. (*G. myrsinites* Hook.) Alb. and B. C. to Wash. and Colo. Cult. 1830. Zone V.

A closely related species is **G. ovatifòlia** A. Gray. Diffuse shrub to 30 cm.: lvs. orbicular-ovate to ovate, 2–3.5 cm. long, acute or short-acuminate, truncate or subcordate: corolla 4.5–5 mm. long, much longer than calyx: fr. 7–9 mm. across. Brown & Schaeffer, Alp. Pl. Can.t.58b(c). B. C. to Idaho and Ore. Cult. 1890.

Zone V.—Another related species is **G. adenóthrix** Maxim. Stems to 30 cm., hispid: lvs. ovate to suborbicular, 1.5–3 cm. long, obtuse or acute, ciliate-serrulate, glabrous: fls. nodding, several at end of brts. on upright hirsute bracted pedicels 1.5–3 cm. long: corolla 8 mm. long, white, often pinkish: fr. red. N.T.1:164. (*Diplycosia a.* Nakai.) Japan. Intr. 1915. Zone V.—Handsome low shrub with rather conspicuous fls. borne well above the lvs.

25. **PERNÉTTYA** Gaudich. Evergreen low shrubs; winter-buds small, with few outer scales: lvs. alternate, short-petioled, small, usually setose-serrate: fls. axillary, usually solitary, nodding on slender pedicels, rarely racemose; calyx 5-parted, usually spreading; corolla urceolate with 5 short lobes; stamens 10; anthers opening by apical pores, with 4 short awns: fr. a globose 5-celled many-seeded berry subtended at base by the dry calyx. (After A. J. Pernetty, who accompanied Bougainville and wrote "A voyage to the Falkland Islands"; 1716–1801.) Also spelled *Pernettia*. About 25 species in Am. from Mex. to the Magellan reg.

P. mucronàta Gaud. Much-branched shrub to 0.5 m.; brts. puberulous and often sparingly strigose: lvs. nearly 2-ranked, ovate to ovate-lanceolate, 1–2 cm. long, spiny-pointed, serrate, lustrous, lateral veins obsolete beneath: fls. solitary, nodding; pedicels shorter than lvs., with 2–4 bractlets; corolla 5 mm. long, white, tinged pink: fr. white to dark purple, red in the typical form, 8–12 mm. across. Fl.v–vi; ix–iii. B.M.3093(c);8023(c). B.R.1695(c). Gn.23:470,t(c). 59:41;79:609. M.G.13:397(h). (*Arbutus mucronata* L., *P. phillyreaefolia* DC.) Chile to Magellan Region. Cult. 1828. Zone VII?—Numerous forms have been raised in gardens, partly from crosses between the type and var. *angustifolia* and distributed under various names (*P. hybrida* Zabel, *P. floribunda* Hort., *P. Cumingii* and *P. Drummondii* Hort.) G.C.II.18:649;III.28:465. Some of the more important color forms are: Var. **alba** Davis. Fr. white. B.M.8023,f.(c). R.B.12:253,t,f.1(c). Gn.23:470,t, f.(c).—Var. **ròsea** Davis. Fr. pink. Gn.23:470,t.f.(c).—Var. **coccínea** Davis. Fr. bright red. F.M.1879:339,t(c). Gn.23:470,t(c).—Var. **lilácina** Davis. Fr. lilac. F.M.1879:339,t(c). R.B.12:253,t(c).—Var. **purpúrea** Davis. Fr. violet-purple. F.M.1879:339,t(c). Gn.23:470,t(c).—A more distinct variety is: Var. **angustifòlia** Nichols. Brts. not strigose: lvs. lanceolate to narrow-lanceolate, smaller, usually turned backward: fls. smaller, anthers twice as long as filament. B.M.3889(c). B.R.26:63(c). E.N.IV.1:46,f.30a-e. (*P. a.* Lindl.) Chile. Cult. 1840.—The Pernettyas are chiefly grown for their profusely produced highly colored frs. which stay on the brs. all winter.

A related species is **P. rupícola** Phil. Young brts. puberulous: lvs. narrow-elliptic, 5–15 mm. long, with 2–5 small teeth on each side, lustrous above and with scattered minute hairs, the lateral veins visible beneath; corolla globose-ovoid, 4 mm. long; calyx more than ½ as long as corolla; stamens shorter than ovary. K.D.470. S.H.2:f.253c(l). (*P. mucronata* var. *r.* Reiche.) Chile. Cult. 1893.—*P. r.* × *mucronata* var. *angustifolia* = **P. rupicoloìdes** Schneid. A rather doubtful hybrid. S.H.2:f.352b-e,353a.

Tribe 4. Arbuteae Drude. Fr. an indehiscent drupe or berry; calyx dry, small: corolla deciduous.

26. **ARBÙTUS** L. Evergreen trees or shrubs; bark of brs. and young stems smooth and exfoliating, usually reddish: lvs. alternate, petioled, serrate or entire: fls. in terminal panicles; calyx deeply 5-lobed, persistent; corolla urceolate; stamens 10, included; anthers with 2 slender awns, opening by terminal pores; disk usually 10-lobed; ovary 5-, rarely 4-celled, ovules numerous: fr. a subglobose, berry-like drupe with mealy flesh, usually granular outside. (Ancient Latin name.) About 12 species in W. N. and C. Am. and in the Mediterr. region.

A. Panicle broad, drooping, not exceeding 10 cm. ..... 1. *A. Unedo*
AA. Panicle upright, pyramidal, larger. ..... 2. *A. Menziesii*

1. **A. Unèdo** L. STRAWBERRY-TREE. Tree to 10 or rarely 12 m.; young brts. glandular-pubescent: lvs. elliptic-oblong or elliptic-obovate, 5–10 cm. long, acute, cuneate, serrate, lustrous dark green above, glabrous; petiole 6 mm. long, glandular: panicles about 5 cm. long; calyx-lobes triangular, ciliolate; corolla 6 mm. long, white or pinkish: fr. strawberry-like, 1.5–2 cm. across, orange-red, warty. Fl. and fr. IX–XII. R.I.11:t.116,f.1,2(c). F.D.20: t.2040(c). L.B.123(c). G.C.III.14:329. S.L.101. Gn.82:437(h);89:608(h). S. W. Ireland and S. Eu. Cult. since centuries. Zone VIII?—Var. **rubra** Ait. Fls. deep pink. Gn.26:506;33:320. F.R.2:375 (var. *Croomii* Hort.).—Var. **integérrima** Sims. Lvs. entire. B.M.2319(c).—Handsome evergreen tree, particularly striking in late autumn with its bright red frs. and white fls.

A related species is **A. Andráchne** L. Tree to 12 m.; young brts. glabrous: lvs. ovate to elliptic-oblong, 5–10 cm. long, obtuse, usually entire; petiole 1–2.5 cm. long: panicles to 10 cm. long and broad; fls. dull white; fr. 1–1.5 cm. across, minutely warty. B.M.2024(c). B.R.113(c). G.C.III.4:724. R.H.1911:307(h). M.A.t. 96(h). E. Mediterr. region. Intr. 1724. Zone VIII.—*A. A.* × *Unedo* = **A. andrachnoïdes** Lk. Intermediate between the parents. B.R.619(c). L.B.580(c). G.C.II.9:211. (*A. hybrida* Ker, *A. serratifolia* Lodd.) Orig. about 1800; also wild in Greece.

2. **A. Menziésii** Pursh. MADRONA. Tree to 15 or occasionally 30 m.; bark reddish brown: lvs. oval or obovate to oblong, 5–12 cm. long, obtuse or acutish, subcordate to broad-cuneate, entire, glabrous or slightly pubescent when young, glaucous beneath; petiole 1–3 cm. long; panicle 6–15 cm. long; corolla 7–8 mm. long, white: fr. broad-ellipsoid or obovoid, 10–13 mm. long, orange-red. Fl.V–VI; fr.X–XII. B.M.8249(c). B.R.1753(c). S.S.5:t.231. G.F.3:515(h);5:151(h). S.L.101(h). Gn.83:324(h);87:471(h). (*A. procera* Dougl.) B. C. to Calif. Intr. 1827. Zone VII or VIII.—A very handsome species with conspicuous fls. and frs.

27. **ARCTOSTÁPHYLOS** Adans. Evergreen shrubs, sometimes prostrate, rarely small trees, with flaky bark; winter-buds ovoid, small, with few outer scales: lvs. alternate, petioled or sessile, entire, rarely toothed, often vertical and similar on both surfaces: fls. small, nodding, in terminal racemes or panicles; calyx 4–5-parted, persistent; corolla urceolate, or oblong-campanulate, 4–5-lobed; stamens 8–10, included; anthers short, with 2 recurved dorsal awns, opening by apical pores; disk 10-lobed: ovary 4–10-celled; cells 1-ovuled; style slender; fr. a smooth or warty, red or yellowish to brownish drupe, with granular, mealy or fleshy pulp or dry and with 4–10 nutlets. (Greek *arctos*, bear, and *staphyle*, bunch of grapes; a translation of bearberry.) Syn. *Uva-ursi* Moench.; including: *Comarostaphylis* Zucc. and *Xylococcus* Nutt. About 50 species in N. and C. Am., and one circumpolar.

A. Trailing shrub with rooting brs.: lvs. rounded, not mucronate: fr. bright red. 1. *A. uva-ursi*
AA. Upright shrubs: lvs. acute or mucronulate.
B. Lvs. glabrous or nearly so: ovary glabrous. ..... 2. *A. manzanita*
BB. Lvs. tomentose or pubescent beneath: ovary tomentose. ..... 3. *A. tomentosa*

1. **A. uva-úrsi** Spreng. BEARBERRY. Prostrate shrub with rooting brs. to 50 cm. long; young brts. glabrous or slightly tomentulose: lvs. obovate to obovate-oblong, 1.5–2 cm. long, cuneate, revolute, glabrous, bright green above, lighter beneath, thinly coriaceous: fls. few, on pedicels 3–4 mm. long; corolla urceolate, 4–6 mm. long, white, tinged pinkish: fr. globose, 6–8 mm. across, red, lustrous. Fl.IV–VII; fr.VII–IX. G.H.t.58(c). R.I.17:t.116,f.3(c). M.N.1:t.20(c). Em.431,t(c). Gn.14:68(h). G.W.14:69(h). (*A. officinalis*

Wimm. & Grab., *Uva-ursi procumbens* Moench, *U. uva-ursi* Brit.) Eu. and N. Asia; in N. Am., s. to Va., N. Mex. and N. Calif. Cult. 1800. Zone II or I?

Another species with decumbent, but not rooting brs. is **A. nevadensis** Gray. Lvs. oblong-obovate to oblanceolate, mucronate, fls. several; corolla 7–8 mm. long: fr. depressed-globose, brown. S.H.2:f.357e-g(l). (*Uva-ursi n.* Abrams.) Calif. Intr. ?

2. **A. manzanîta** Parry. Manzanita. Upright shrub to 4 m.; brts. puberulous or nearly glabrous: lvs. petioled, broad-ovate to ovate or obovate, 2.5–5 cm. long, obtuse and mucronate, entire, dull green, puberulous when young, coriaceous: fls. in dense panicles about 3 cm. long, tomentulose or glabrous: corolla 7–8 mm. long, white or light pink; ovary glabrous: fr. depressed-globose, 8–12 mm. across, brownish red. Fl.iv–v; fr.viii–x. B.M.8128(c). G.F.4:571. G.C.III.44:163. B.S.1:204. Gn.83:68(h),69. S.L.102(h). (*Uva-ursi m.* Abrams.) Ore. to C. Calif. Intr. 1897. Zone VII or VIII?—Evergreen shrub with dense panicles of white or pink fls. in spring, of distinct appearance.

3. **A. tomentôsa** Lindl. Woolly Manzanita. Upright shrub to 4 m.; young brts. tomentose and often glandular or hispid: lvs. petioled, broad ovate to oblong, 2.5–5 cm. long, obtuse and mucronate, dark green or grayish green above, tomentose beneath or rarely nearly glabrous: fls. in dense or loose panicles, 2–4 cm. long; pedicels pubescent; corolla 6–7 mm. long, white to pink: fr. depressed-globose, 6–7 mm. across, brownish red. Fl.iv–v; fr.viii. B.M.3320(c). B.R.1791(c). (*Uva-ursi t.* Abrams.) B. C. to Calif. Cult. 1833. Zone VII or VIII.—Similar to the preceding, but more or less pubescent or tomentose.

28. **ARCTÒUS** Niedenz. Deciduous depressed glabrous shrubs; winter-buds with several outer scales: lvs. alternate, petioled, serrulate: fls. few, in terminal clusters; calyx persistent, 4–5-lobed; corolla urceolate, with 4–5 small lobes; stamens included, 8 or 10; anthers awned; ovary 4–5-celled: fr. a berry-like juicy drupe with 4–5 separate nutlets. (Greek *arctōus*, boreal; referring to its distribution.) Two circumpolar species.

A. alpìnus Niedenz. Low depressed shrub: lvs. obovate to oblanceolate, obtuse or acutish, narrowed into a short petiole, often ciliate, bright green, reticulate: fls. 2–4, 4 mm. long, white, tinged pinkish, with ciliate lobes: fr. black or purplish black, 6–10 mm. across. Fl.iv–vi; fr.viii–x. R.I.17:t.116,f. 4(c). F.D.20:t.2041(c). S.E.6:t.880(c). M.G.25:138(h). (*Arctostaphylos alpina* Spreng., *Mairania alpina* Desv.) N. Eu., N. Asia; in N. Am. from Greenl. and Lab. to Que. and N. H. Cult. 1789. Zone I or II.—Dwarf tufted shrub, the lvs. turning bright red in autumn; suited for a cool place in the alpine rock garden.

A closely related species is **A. rúber** Nakai. Lvs. usually obovate, brighter green: corolla narrower with entire or obscurely erose lobes: fr. bright red, 9–13 mm. across. (*A. alpinus* var. *r.* Rehd. & Wils., *A. erythrocarpa* Small, *Arctostaphylos r.* Fern.) Man. to Alaska and B. C.; W. China, Korea. Intr.? Zone V?

Tribe 5. Ericeae Drude. Corolla persistent: fr. a septicidal, rarely loculicidal caps.: evergreen shrubs with opposite or whorled, small needle-shaped or scale-like lvs.

29. **CALLÙNA** Salisb. Heather. Evergreen small shrub; winter-buds minute, with few scales: lvs. scale-like, opposite, 4-ranked, sessile, keeled: fls. in terminal spikes; calyx 4-parted, colored, with 4 small bractlets at base, longer than the 4-parted campanulate corolla, both becoming scarious and persistent; stamens 8, shorter than corolla, with 2 reflexed appendages on

back; style slender, about as long as calyx: caps. 4-valved, septicidal, included in the persistent perianth, few-seeded. (Greek, *kallunein*, to sweep; referring to the use of the branches for brooms.) One species in Eu. and. Asia Minor.

C. vulgàris Hull. Heather. Upright shrub to 0.4, rarely to 0.8 m.; lvs. oblong-ovate, 1–3 mm. long, sagittate at base, puberulous or nearly glabrous: fls. nodding or spreading, usually rosy-pink, in dense racemes 3–15 cm. or sometimes to 25 cm. long; calyx about 6 mm. long, the lobes ovate-oblong: caps. 2–2.5 mm. broad. Fl.vii–ix. R.I.17t.111,f.2(c). F.D.20:t.2022(c). M.M.9:t.5(c). B.C.2:631. Gn.85:208(h);86:27(h). (*Erica v.* L.) Eu., Asia Minor; rare in n. e. N. Am.—Numerous forms are in cult.: Var. **alba** Sweet. Fls. white. (*Erica v.* var. *a.* West.)—Var. **Seàrlei** Bean. Taller, of loose feathery growth: fls. white, late.—Var. **Hammóndii** Bean. Tall: lvs. bright green: fls. white.—Var. **cárnea** Sweet. Fls. pink.—Var. **coccínea** Don. Fls. deep red. (Var. *rubra* Kirchn.)—Var. **Alpórtii** Kirchn. Taller, of more vigorous growth: lvs. dark or grayish: fls. crimson.—Var. **atrórubens** Loud. Brts. pubescent: fls. deep red.—Var. **múltiplex** Sweet. Fls. double pink: rather dwarf.—Var. **serótina** Loud. Brts. pubescent: fls. white, late.—Var. **nàna** Kirchn. Low, only about 10 cm. tall: fls. purple. (Var. *pygmaea*, var. *minima* Hort.)—Var. **Fóxii** Bean. Very dwarf, forming close cushion-like tufts.—Var. **decúmbens** Don. With spreading, partly prostrate brs.: fls. pink, in short racemes. (Var. *prostrata* Kirchn.)—Var. **aùrea** Forbes. Lvs. golden: dwarf.—Var. **cúprea** Bean. Lvs. golden in summer, bronze in winter.—Var. **hirsùta** S. F. Gray. Brts. and lvs. with grayish tomentum. R.I.17:t.111,f. 3(c). (Var. *tomentosa* Don, var. *pubescens* Koch, var. *incana* Reichenb. f.)—Low evergreen shrub, valued for its late fls. and very effective when planted in masses; adapted for planting on sandy banks and slopes.

30. **ERÌCA** L. Heath. Evergreen shrubs or rarely small trees: winter-buds minute: lvs. usually whorled, short-petioled, small, usually strongly revolute and linear: fls. terminal or axillary and often forming terminal spikes or panicles; calyx free, 4-parted; corolla campanulate, tubular or ventricose; lobes usually 4, very short, white, pink or rarely yellow; stamens 8; filaments slender; anthers with or without appendages; style slender: caps. subglobose, 4-valved, enclosed in the persistent corolla; seeds many, minute. (*Ereike*, the ancient Greek name of the Heath.) About 500 species, mostly in S. Africa, also in the Mediterr. region and C. and N. Eu.

A. Lvs. and calyx-lobes conspicuously ciliate.
B. Fls. in terminal umbel-like clusters; anthers appendaged.....1. *E. Tetralix*
BB. Fls. in terminal spikes; anthers without appendages.....2. *E. ciliaris*
AA. Lvs. and sepals glabrous.
B. Anthers included in the corolla-tube.
C. Brts. finely pubescent: fls. in terminal racemes or panicles; corolla about 6 mm. long. 3. *E. cinerea*
CC. Brts. glabrous: fls. axillary, forming cylindric spikes; corolla 2–3 mm. long. 4. *E. scoparia*
BB. Anthers exserted; fls. lateral.
C. Sepals less than ½ as long as corolla, usually ovate: corolla broad-campanulate. 5. *E. vagans*
CC. Sepals more than ½ as long as corolla, lanceolate; corolla ovoid-oblong...6. *E. carnea*

Subgen. I. EU-ERICA Benth. Anthers affixed on the back to the filaments, often with appendages.

1. **E. Tétralix** L. Cross-leafed H. Shrub to 0.6 m.; brts. minutely villous and glandular-hirsute: lvs. in whorls of 4, linear, 3–4 mm. long, puberulous and glandular-ciliate: fls. 4–12, in dense umbel-like clusters; sepals

ovate-lanceolate, pubescent, ciliate; corolla oblong-ovoid, contracted at the mouth, 6–7 mm. long, rosy; anthers with appendages: caps. pubescent. Fl. VI–IX. R.I.17:t.112,f.1(c). F.D.20:t.2023(c). S.E.6:t.889(c). N. and W. Eu.; naturalized in Mass. Cult. 1789. Zone V.—Var. **alba** Ait. Fls. white. —Var. **Martinèsii** Benth. Brts. and lvs. white-tomentose. (Var. *canescens* Reg., var. *tomentosa* Zabel.)—Var. **mŏllis** Bean. A form of the preceding var. with white fls.

E. T. × *ciliaris* = **E. Mackaïi** Hook. Lvs. in whorls of 4, ovate-oblong, glabrous above; fls. in umbels; corolla shorter and broader: caps. nearly glabrous. S.E.6:t.890(c). (*E. Mackaiana* Bab.) Spontaneous with the parents. Intr. 1833. —Var. **plèna** Rehd. Fls. double. (Var. *fl. pleno* Bean, *E. Crawfurdii* Hort.)—Var. **Watsònii** Rehd. Fls. in short racemes; corolla longer, obliquely urceolate. S.E.6: t.888(c). (*E. ciliaris* var. *W.* Benth., *E. W.* Bean.)—*E. T.* × *vagans* = **E. Williămsii** Druce. Brts. puberulous: lvs. sparingly ciliate, minutely puberulous in the middle above or nearly glabrous; corolla rose, urceolate; stamens included. Spontaneous with the parents. Intr. about 1911.

2. **E. ciliàris** L. FRINGED H. Shrub with prostrate stems and ascending brs., to 0.7 m.; young brts. densely pubescent: lvs. ternate, ovate, 2–3 mm. long, glabrous but glandular-ciliate: fls. in whorls of 3, forming terminal racemes 5–12 cm. long; sepals lanceolate, ciliate; corolla obliquely urceolate, 8–10 mm. long; rosy-purple; anthers without appendages: caps. glabrous. Fl.VI–X. B.M.484(c). L.B.1805(c). S.E.6:t.887(c). Gn.53:364,t(c). W. Eu. from the Brit. Isles to Spain. Intr. 1773. Zone VII?—Var. **Maweàna** Bean. Of more vigorous and more upright habit: lvs. darker green; corolla 1.2 mm. long. B.M.8443(c). Gn.26:259. (*E. M.* Backh.) Portugal. Intr. 1872.

E. c. × *Tetralix* = *E. Mackaii;* see under No. 1.

3. **E. cinérea** L. TWISTED H. Shrub with ascending brs. to 0.6 m.; young brts. minutely pubescent: lvs. usually ternate, linear, 5–7 mm. long, glabrous except minutely ciliolate, lustrous above: fls. in umbels or terminal racemes to 7 cm. long; sepals narrow-lanceolate; corolla ovoid, 6 mm. long, rosy-purple; anthers with dentate appendages: caps. glabrous. Fl.VI–IX. R.I.17:t.112,f.3(c). F.D.20:t.2024(c). S.E.6:t.891(c). W. Eu.; nat. in Mass. Cult. 1750. Zone V.—Var. **atropurpúrea** Lodd. Fl. deep purple. L.B.1409(c). —Var. **pállida** Lodd. Fls. light rose. L.B.1505(c).—Var. **alba** Bedf. Fls. white. Gn.61:430(h).—Var. **coccínea** Bean. Fls. red, not purple.

Related species are: **E. terminàlis** Salisb. Upright shrub to 1 m.: lvs. minutely pubescent, 4–5 mm. long, usually in whorls of 4: fls. 4–8, in umbels; sepals lanceolate: corolla oblong-ovoid, 6 mm. long, rosy; anthers with entire appendages: caps. silky. B.M.8063(c). S.L.58(h). (*E. stricta* Andr., not Willd., *E. multicaulis* Salisb., *E. corsica* DC.) S. Eu. Intr. 1765. Zone VIII?—**E. arbórea** L. Shrub or tree to 6 m.; young brts. pubescent, with branched hairs: lvs. usually ternate, 3–6 mm. long, glabrous: fls. in large pyramidal panicles, fragrant; sepals ovate; corolla subglobose, 3–4 mm. long, nearly white; anthers with short appendages. R.I.17: t.113,f.1(c). F.D.20:t.2025(c). Gn.79:288(h). S.L.195(h). Mediterr. reg. Intr. 1658. Zone VIII.—Var. **alpìna** Dieck. A lower and stiffer plant: lvs. bright green. Gn.75:384. G.C.III.65:283(h). Spain. Cult. 1899. Zone VI or VII?— *E. a.* × *lusitanica* = **E. Veìtchii** Bean. Similar to *E. arborea*, but hairs of brts. partly simple: stigma pink. G.C.III.37:138. Gn.71:101(h). Orig. before 1905. The other parent, *E. lusitanica* Rudolphi, is not hardy within our area.

4. **E. scopària** L. BESOM H. Shrub to 3 m., with upright brs.; brts. glabrous: lvs. in whorls of 3 or sometimes 4, linear, 4–6 mm. long, acute, lustrous dark green, glabrous: fls. 1–4, axillary, short-stalked, forming long cylindric spikes: corolla greenish, 2 mm. long; stamens without appendages: caps. glabrous. Fl.V–VI. R.I.17:t.113,f.3(c). D.H.1:379. W. Mediterr. region, n. to C. France. Intr. 1770. Zone VII?—Var. **pùmila** Bean. A dwarf form, rarely exceeding 0.5 m.—Vigorous upright Heath with dark lustrous foliage and profuse, but insignificant fls. in spring.

5. **E. vágans** L. Cornish H. Low spreading and decumbent shrub, to 0.5 m.: brts. glabrous; yellowish gray: lvs. in whorls of 4–5, spreading, linear, 4–10 mm. long, dark green, glabrous: fls. usually in axillary pairs on slender pedicels about 8 mm. long, forming cylindric racemes 8–16 cm. long; corolla broad-campanulate with obtuse, nearly upright, lobes, about 3 mm. long, pinkish purple; anther-cells separated nearly to the base, without appendages. Fl.VII–X. R.I.17:t.113,f.2(c). F.D.20:t.2027(c). S.E.6:t.893(c). Gn.84: 420(h). S.L.58(h). W. Eu., from Ireland to Portugal. Cult. 1811. Zone V.—Var. **grandiflòra** Dipp. Fls. larger than in the type.—Var. **rúbra** Dipp. Fls. more deeply colored.—Var. **alba** Sweet. Fls. white.—Attractive low shrub forming large patches and flowering in late summer and in autumn.

E. v. × *Tetralix* = *E. Williamsii;* see under No. 1.

Related species are: **E. verticillàta** Forsk. Brts. whitish gray: lvs. usually 3, more upright, 4–6 mm. long: fls. on shorter pedicels in less dense spikes. R.I.17: t.115,f.3(c). S. E. Eu. Intr. 1774. Zone V or VI.—**E. multiflòra** L. Upright shrub to 1 m.: lvs. 5–6: fls. in dense spikes; corolla pink, about 5 mm. long; sepals lanceolate, slightly less than half as long; anther-cells only slightly separated at top. R.I.17:t.114,f.2(c). L.B.1572(c). Gt.50:t.1483,f.9(c). S. Eu. Intr. 1731. Zone VII or VIII.

Subgen. II. ECTASIS Benth. Anthers forming the continuation of the filament, without appendages.

6. **E. cárnea** L. Spring H. Spreading shrub with decumbent stems, to 0.3 m., rarely taller; brts. glabrous: lvs. usually in whorls of 4, linear, 4–8 mm. long, bright green: fls. 2–4, axillary, forming terminal one-sided racemes 2–5 cm. long; pedicels about as long as calyx; corolla ovoid, 5–6 mm. long, rosy-red, like the sepals; anthers dark red. Fl.III–V. B.M.11(c). R.I.17:t. 114,f.1(c). F.D.20:t.2026(c). Gn.72:176(h);78:101(h);80:605(h);86:27(h). S.L.195(h). (*E. herbacea* Auct., not L.) C. and S. Eu. Intr. 1763. Zone V.—Var. **purpuráscens** Regel. Fls. purple.—Var. **alba** Zabel. Fls. white.—Handsome low shrub chiefly valued for its early bright fls.

E. c. × *mediterranea* = **E. darleyénsis** Bean. Taller than *E. carnea*, but without the single upright stem of *E. mediterranea*. Gn.78:6(h);88:79(h). (*E. mediterranea hybrida* Bean, *E. hybrida* Hort.) Orig. before 1894.

A related species is: **E. mediterrànea** L. Upright shrub to 3 m.: fls. smaller, with broader corolla-lobes. R.I.17:t.115,f.1(c). B.S.1:523. S.L.195(h). G.W.17: 369(h). (*E. carnea* var. *occidentalis* Benth.) W. Eu., Ireland to Portugal and Spain. Intr. 1765. Zone VI or VII.—Var. **alba** Bean. Fls. white.—Var. **hibérnica** Hook. & Arn. Shrub to 1 m.: lvs. glaucous. S.E.6:t.893(c). (Var. *glauca* Hort., *E. h.* Syme.) Ireland.

31. **BRUCKENTHÀLIA** Reichenb. Evergreen low shrub: lvs. alternate or in whorls of 4, linear: fls. 4-merous in short terminal dense spikes; calyx 4-lobed to about the middle, lobes denticulate, colored; corolla campanulate, deeply 4-lobed; stamens 8, included; filaments connate at base and adnate to corolla; anthers ellipsoid, attached at base to filament, opening by oblong terminal pores; disk rudimentary; style exserted: caps. subglobose, 4-valved, loculicidal, enclosed in the persistent calyx. (After S. von Bruckenthal, an Austrian nobleman.) One species.

B. spiculifòlia Reichenb. Spike-heath. Dwarf shrub to 25 cm., with upright slender brs.; young brts. downy: lvs. crowded, spreading, linear, 3–5 mm. long, bristle-pointed, slightly glandular and pubescent; racemes about 2 cm. long, corolla pink, 3 mm. long; calyx half as long. Fl.VI–VIII. B.M. 8148(c). R.I.17:t.111,f.1(c). B.S.1:268. S.L.59(h). (*Erica s.* Salisb., *B. spiculiflora* Reichenb. f.) S. E. Eu. and Asia Minor. Cult. 1880. Zone V.—Interesting small shrub adapted for the rock-garden.

Subfam. II. VACCINIOÌDEAE Drude. Ovary inferior, rarely only half-inferior; fr. a berry crowned by the persistent calyx-lobes.

32. **CHIÓGENES** Salisb. Evergreen trailing and creeping plant with slender slightly woody stems: lvs. alternate, small, short-petioled, ovate: fls. axillary, solitary; pedicels short, nodding, with 2 large bractlets under the 4-parted calyx; corolla campanulate, deeply 4-cleft; stamens 8, included; filaments short, inserted on the 8-toothed disk; anther-cells separate, each minutely 2-pointed at apex and opening by a large chink down to the middle; ovary 4-celled, adnate below the middle to the calyx-tube and growing into an almost wholly inferior, white, many-seeded berry crowned by the 4 calyx-teeth. (Greek *chion*, snow, and *genos*, offspring; in allusion to the snow-white berries.) Two species in N. Am. and E. Asia.

C. hispídula Torr. & Gr. Brts. appressed-setose: lvs. orbicular-ovate to ovate, 4–10 mm. long, narrowed at ends, revolute, lustrous and glabrous above, paler beneath and rusty-strigose on midrib: fls. 4 mm. long, white: fr. subglobose, about 6 mm. across, usually minutely bristly, aromatic. Fl. v–vi; fr.viii–ix. Torrey, Fl. N. Y. 1:t.68(c). B.B.2:704. (*C. serpyllifolia* Salisb.) Nfld. to B. C., s. to N. C. and Mich. Intr. about 1880. Zone IV?—Attractive little plant of aromatic flavor, forming a dense bright green carpet studded with white berries in summer; adapted for a cool half-shady place in the rock garden.

33. **GAYLUSSÀCIA** H.B.K. Huckleberry. Deciduous or evergreen shrubs; winter-buds ovoid, with about 3 outer scales: lvs. alternate, short-petioled, usually entire: fls. in axillary, usually few-fld., racemes; calyx 5-lobed; corolla tubular-campanulate or urceolate, 5-lobed; stamens 10; filaments short; anthers narrowed upward and opening by terminal pores or chinks: ovary 10-celled: fr. a berry-like drupe with 10 1-seeded nutlets, crowned by the persistent calyx-lobes. (After J. L. Gay-Lussac, eminent French chemist; died 1850.) Syn. *Adnaria* Raf. About 50 species in N. and S. Am.

A. Lvs. evergreen, obtusely serrate, not resinous.....1. *G. brachycera*
AA. Lvs. deciduous, entire, resinous-dotted beneath.
B. Corolla campanulate; fls. in loose racemes: lvs. not viscid.
C. Pubescence glandular; bracts as long as pedicels, persistent.....2. *G. dumosa*
CC. Pubescence not glandular or absent; bracts shorter than the pedicels, deciduous.
D. Lvs. acuminate or acute: fr. black.....3. *G. ursina*
DD. Lvs. obtuse: fr. blue, bloomy.....4. *G. frondosa*
BB. Corolla conic-ovoid; fls. in dense short racemes: young lvs. very resinous, viscid. 5. *G. baccata*

1. **G. brachýcera** Gray. Box-H. Shrub to 0.5 m., with creeping and ascending stem and spreading glabrous angled brs.: lvs. elliptic, 1.5–2.5 cm. long, slightly revolute, glabrous: fls. few, in short racemes with caducous bracts and bractlets: corolla cylindric-ovoid, 4 mm. long, white or pink. Fl.v–vi; fr.vii–viii. B.M.928(c). Add.6:t.201(c). L.B.648(c). B.B.2:696. Pa. to Va. Intr. 1796. Zone V.—Attractive low evergreen shrub.

2. **G. dumòsa** Torr. & Gr. Dwarf H. Shrub with creeping stem and erect somewhat glandular-hairy brs., to 0.5 m.: lvs. subsessile, obovate-oblong to oblanceolate, 2.5–4 cm. long, mucronate, lustrous above, lighter green and glandular-pubescent beneath: racemes loose, with foliaceous persistent bracts; corolla 5–7 mm. long, white, pink or red: fr. black, 6–8 mm. across, insipid. Fl.v–vi; fr.vii–ix. B.M.1106(c). B.S.1:584. B.B.2:696. Nfld. to Fla. and La.; in sandy swamps. Intr. 1774. Zone II?—Var. **Bigeloviàna** Fern. Lvs. elliptic-obovate to oblong-obovate, glandular on both sides as are the bracts; corolla 8–9 mm. long. Nfld. to R. I. and Conn.

3. **G. ursìna** Torr. & Gr. Buckberry. Shrub to 2 m., with spreading brs.; young brts. slightly pubescent: lvs. obovate to oblong, 4–10 cm. long, acute or short-acuminate, cuneate or rounded, slightly pubescent on both sides, green beneath, thin; fls. in 6–10-fld. racemes 2–5 cm. long; pedicels slender, about 1 cm. long; calyx glandular; corolla short-campanulate, 4–5 mm. long, with recurved lobes, whitish or reddish: fr. shining black, 8–12 mm. across, sweet. Fl.v–vi; fr.vii–viii. Mem. Am. Acad. II.3:t.10. (*Vaccinium ursinum* Curtis.) N. and S. C. Intr. 1891. Zone V.

4. **G. frondòsa** Torr. & Gr. Dangleberry. Shrub to 2 m., with spreading brs.; brts. glabrous: lvs. elliptic-obovate to oblong, 2.5–6 cm. long, obtuse or emarginate, pale green above, glaucescent, puberulous and resin-dotted beneath, rather firm: fls. in slender racemes 3.5–7 cm. long; pedicels 1–2.5 cm. long; corolla broad-campanulate, 5 mm. long, greenish purple: fr. 8–12 mm. across, edible. Fl.v–vi; fr.vii–viii. A.R.2:t.140(c). Em.451,t(c). G.C. III.7:580. B.B.2:695. (*Vaccinium frondosum* L.—Tangleberry, Blue H.) N. H. to Fla. Intr. 1761. Zone IV.

5. **G. baccàta** K. Koch. Black H. Shrub to 1 m., upright; young growth densely resinous and sticky: lvs. elliptic to oblong-lanceolate or elliptic-obovate, 2.5–5 cm. long, obtuse or mucronulate, yellowish green above, paler and resin-dotted beneath: fls. in dense drooping racemes 1–2.5 cm. long; pedicels 2–8 mm. long; corolla 5 mm. long, dull red: fr. 6–8 mm. across, lustrous black, edible. Fl.v–vi; fr.vii–viii. B.M.1288(c). Em.451,t(c). I.T.4:t.152. (*G. resinosa* Torr. & Gr.) Nfld. to Man., s. to Iowa, Ill. and Ga. Intr. 1772. Zone II or III.—Var. **glaucocárpa** Robins. Fr. larger, blue, bloomy.—Var. **leucocárpa** Fern. Fr. white to pinkish, somewhat translucent.

34. **VACCÌNIUM** L. Deciduous or evergreen shrubs, rarely trees; winter-buds small, ovoid, with 2 or several outer scales: lvs. alternate, short-petioled, entire or serrate: fls. axillary or terminal, solitary or in racemes; calyx-lobes 4–5, rarely obsolete; corolla cylindric, urceolate or campanulate, 4–5-lobed or sometimes 4-parted; stamens 8 or 10; anthers awned or awnless, prolonged into terminal tubes, with an opening at the apex; ovary inferior, 4–10-celled: fr. a many-seeded berry crowned by the persistent calyx-lobes. (Ancient Latin name of obscure derivation.) About 130 species in the n. hemisphere, from the arctic circle to high mts. in the Tropics.

A. Corolla campanulate or urceolate to cylindric, 4–5-lobed.
  B. Corolla broad-campanulate, 5-lobed; anthers awned: ovary incompletely 10-celled; fls. racemose.
    C. Anthers included; calyx articulated with the pedicel: fr. black. ....Sect. Batodendron
      1. *V. arboreum*
    CC. Anthers exserted; calyx and pedicels continuous: fr. usually greenish.
      Sect. Polycodium
      2. *V. stamíncum*
  BB. Corolla urceolate, cylindric-campanulate or cylindric, with short lobes.
    C. Anthers not awned; filaments pubescent; corolla cylindric or cylindric-campanulate; ovary usually incompletely 10-celled; fls. in racemes or clusters.
      D. Lvs. deciduous; ovary usually incompletely 10-celled.....Sect. Cyanococcus
        E. Fls. in elongated bracted racemes: lvs. serrulate.
          F. Pedicels 1–3 mm. long; upper bracts small.....3. *V. ciliatum*
          FF. Pedicels 5–8 mm. long: all bracts large, elliptic.....4. *V. Arctostaphylos*
        EE. Fls. in short cluster-like racemes.
          F. Ovary and fr. glandular-hirsute.....5. *V. hírsutum*
          FF. Ovary and fr. glabrous.
            G. Corolla cylindric; lvs. pubescent beneath, serrulate or entire.6. *V. virgatum*
            GG. Corolla urceolate to cylindric-ovoid.
              H. Fls. short-pediceled, in dense several- to many-fld. clusters.
                I. Shrubs to 4 m. tall: lvs. 3–8 cm. long.
                  J. Lvs. glabrous or only slightly pubescent beneath..7. *V. corymbosum*
                  JJ. Lvs. densely pubescent beneath.....8. *V. atrococcum*

II. Shrubs to 0.5 m. high, rarely slightly taller: lvs. smaller.
J. Lvs. entire.
K. Brts. and lvs. glabrous or sometimes pubescent beneath. 9. *V. vacillans*
KK. Lvs. pubescent on both sides: brts. pubescent. 10. *V. canadense*
JJ. Lvs. serrulate, glabrous or pubescent beneath. 11. *V. pennsylvanicum*
HH. Fls. 1–3; pedicels longer than calyx-tube: lvs. serrulate.
I. Lvs. acute to acuminate: branched shrub to 0.5 or 1.5 m. tall. 12. *V. hirtum*
II. Lvs. obtuse or acutish, glabrous: stems nearly simple, to 15 cm. tall: fr. red. 13. *V. praestans*
DD. Lvs. evergreen.
E. Corolla cylindric-ovoid: fr. blue-black; ovary incompletely 10-celled. 14. *V. myrsinites*
EE. Corolla campanulate; ovary 4- or 5-celled. Sect. Vitis-idaea
F. Corolla 5-lobed: lvs. acute. 15. *V. ovatum*
FF. Corolla 4-lobed: lvs. obtuse. 16. *V. Vitis-idaea*
CC. Anthers awned; filaments glabrous: ovary 4–5-celled: lvs. deciduous: fls. axillary, solitary or 2–4, nodding. Sect. Eu-Vaccinium
D. Fls. 4-merous, solitary or 2–4. 17. *V. uliginosum*
DD. Fls. 5-merous, solitary, axillary.
E. Brts. terete: low shrub to 0.3 m. tall. 18. *V. caespitosum*
EE. Brts. angled.
F. Lvs. serrate.
G. Lvs. 1–2 cm. long; shrub to 0.5 m. tall. 19. *V. Myrtillus*
GG. Lvs. 2–5 cm. long: shrub to 1.5 m. tall. 20. *V. membranaceum*
FF. Lvs. entire or nearly so. 21. *V. ovalifolium*
AA. Corolla deeply 4-cleft or 4-parted with revolute lobes.
B. Lvs. deciduous: upright shrubs. Sect. Oxycoccoides
C. Lvs. pubescent on the veins above and beneath. 22. *V. erythrocarpum*
CC. Lvs. quite glabrous or pubescent only near the base beneath. 23. *V. japonicum*
BB. Lvs evergreen: trailing shrubs. Sect. Oxycoccus
C. Lvs. ovate, acute. 24. *V. Oxycoccus*
CC. Lvs. oblong, obtuse. 25. *V. macrocarpum*

Sect. 1. Batodendron A. Gray. Corolla campanulate, 5-lobed, stamens included; style exserted; fls. in racemes, jointed with the pedicel; ovary incompletely 10-celled; fr. black. (*B.* Nutt.)

1. **V. arbòreum** Marsh. Farkleberry. Spreading shrub or small tree, to 9 m., evergreen in the S.; young brts. glabrous or slightly pubescent: lvs. obovate to oblong, 2–5 cm. long, acute or obtuse, entire or obscurely denticulate, glabrous and lustrous above, sometimes pubescent beneath, subcoriaceous: fls. axillary or in terminal bracted racemes 2–6 cm. long; pedicels 6–15 mm. long; corolla white, 6 mm. long: fr. globose, 6 mm. across, black, inedible. Fl. VII–VIII; fr. X–XI. B.M.1607(c). L.B.1885(c). S.S.5:t.230. B.B. 2:698. (*Batodendron a.* Nutt., *B. andrachneforme* Small.) Va. and N. C. to Fla., S. Ill. and Tex. Intr. 1765. Zone VII or VIII.—Var. **glaucéscens** Sarg. Lvs. glaucescent, glabrous or pubescent: bracts of inflorescence larger. S.M.804. S. Ill. and S. Mo. to La. and Tex.

Sect. 2. Polycodium. Corolla campanulate, 5-lobed; stamens exserted: fls. not jointed, in bracted racemes; ovary incompletely 10-celled: fr. greenish or yellowish or nearly black. (*P.* Raf.)

2. **V. stamíneum** L. Deerberry. Diffusely branched shrub to 0.8 m.; brts. pubescent: lvs. elliptic or ovate to ovate-oblong, 3–10 cm. long, acute, entire, glaucous and pubescent beneath: fls. in many-fld. leafy-bracted downy racemes 3–6 cm. long; pedicels 4–8 mm. long; calyx glabrous; corolla greenish white or purplish, 6–8 mm. long, open in bud: fr. globular or pear-shaped, greenish, bloomy, inedible. Fl. V–VI; fr. IX. A.R.t.263(c). R.H.1907:94. M.O.t.28. B.B.2697. (*Polycodium s.* Greene, *P. candicans* Small.) Mass. to Minn., s. to Fla. and La. Intr. 1772. Zone V.—Distinct shrub with pale foliage and fairly conspicuous fls. in spring.

Closely related species are: **V. negléctum** Fern. Glabrous: lvs. oblong-lanceolate to narrow-obovate, short-acuminate, green or slightly glaucous beneath: fls. white or pink. (*Polycodium n.* Small.) Va. to Kans., Fla. and La. Intr.?

Zone VI or VII.—**V. melanocárpum** C. Mohr. Young growth white-pubescent: calyx white-tomentose: fr. dark purple, lustrous, edible. (? *V. stamineum fr. coeruleo* Hort.) N. C. to Ga. and Ala. Intr. 1909. Zone V.

Sect. 3. Cyanococcus Gray. Corolla unceolate to cylindric or ovoid-campanulate, with 5 short lobes; anthers awnless; filaments pubescent: fls. in racemes or clusters from separate buds: ovary usually incompletely 10-celled. (*C.* Rydb.)

3. **V. ciliàtum** Thunb. Upright much-branched shrub, to 4 m.; young brts. pubescent: lvs. short-petioled, ovate to elliptic, 3–8 cm. long, acute to acuminate, sometimes obtusish and mucronulate, ciliate-serrulate, setose on the veins beneath and usually above near margin, green on both sides: racemes 3–6 cm. long, leafy-bracted toward the base, pubescent; pedicels nodding, 1–4 mm. long, glandular-pubescent; sepals broad-ovate; corolla campanulate, 4 mm. long, reddish; stamens nearly as long as corolla: fr. globose, 6–8 mm. across, the apex slightly exserted above the sepals, black, edible. Fl.vi–vii; fr.ix. N.T.1:172. N.K.8:t.23. Japan, Korea. Intr. 1892. Zone V.—Rather coarse shrub with the lvs. turning crimson in autumn.

A related species is **V. bracteàtum** Thunb. Evergreen shrub to 1.5 m.: lvs. elliptic to elliptic-oblong, 2.5–6 cm. long, acute, remotely serrulate, glabrous or nearly so: racemes 2–5 cm. long, with persistent lanceolate leafy bracts; corolla cylindric-ovoid, 6–7 mm. long, puberulous: fr. red. S.I.2:t.61(c). L.B.1648(c). S.H.2:f.366o-p,367i-k. (*Andromeda chinensis* Lodd.) Japan, China. Cult. 1830. Zone VII or VIII.

4. **V. Arctostáphylos** L. Shrub to 3 m.; young brts. terete, glabrous or pubescent: lvs. ovate-oblong, 3–10 cm. long, acute or acuminate, broad-cuneate or rounded, serrulate, dark green above and pubescent on veins, paler and pubescent beneath, more densely on veins, sometimes nearly glabrous: racemes 3–5 cm. long; pedicels 5–8 mm. long, as long or shorter than the leafy elliptic bracts; corolla campanulate, 6–8 mm. long, greenish white, tinged purple; sepals triangular: fr. globose, 6–8 mm. across, purple. Fl.v–vi; fr.viii–ix. B.M.974(c). L.D.1:t.38(c). B.S.2:623. Cauc. Intr. 1800. Zone V.

5. **V. hirsùtum** Buckl. Hairy Huckleberry. Low shrub to 1 m.: brts. pubescent: lvs. ovate to elliptic-oblong, 2–6 cm. long, acute, entire, dull green above, paler beneath, pubescent on both sides: racemes dense and short; calyx-lobes acute; corolla ovoid, 9–12 mm. long, white, tinged pink, hairy like the calyx: fr. purplish black, glandular-hirsute, 6–7 mm. across, edible. Fl.v–vi; fr.viii. G.F.2:365. N. C. to Tenn. and Ga. Intr. 1887. Zone V.

6. **V. virgàtum** Ait. Rabbiteye Blueberry. Upright shrub to 4 m.; young brts. puberulent: lvs. ovate-oblong to cuneate-lanceolate, 2–5 cm. long, acute, serrulate or entire, green above, pale or glaucous beneath: racemes short, often spicate on naked brs.; bracts small, deciduous; corolla 7–10 mm. long, white or pink: fr. black, sometimes slightly bloomy, 5–7 mm. across. Fl.iv–v; fr.viii. B.M.3522(c). B.R.302(c). B.B.2:703. S. Va. to Fla. and La. Intr. 1770. Zone VIII.—Var. **tenéllum** Gray. Lower: lvs. smaller, 1–3 cm. long; racemes shorter and denser; corolla 6–8 mm. long, nearly white. B.B.2:703. (*V. t.* Ait.) Va. to Ill. and Mo., s. to Fla. and Miss. Cult. 1898. Zone VII?

7. **V. canadénse** Kalm. Canada Blueberry. Much-branched shrub, to 0.5 m.; brts. pubescent: lvs. narrow-elliptic to oblong-lanceolate, 1.5–4 cm. long, acute, entire, pubescent on both sides: fls. in dense clusters; corolla cylindric-campanulate, 4–6 mm. long, greenish white, often reddish: fr. blue, bloomy, 6–8 mm. across. Fl.v; fr.vii–viii. B.M.3446(c). B.B.2:701. (Velvet-leaf B., Sourtop.) Lab. to Man., s. to Va., Ill. and Mo. Intr. 1834. Zone II.

8. **V. atrocóccum** Heller. Downy Swamp Blueberry. Upright shrub with spreading brs., to 4 m.; young brts. pubescent: lvs. elliptic-oblong or elliptic, 3.5–7.5 cm. long, usually acute at ends, dark green above, densely pubescent beneath, unexpanded at flowering time: fls. in dense racemes; calyx not glaucous; corolla ovoid to ellipsoid, 5–6 mm. long, greenish white, tinged with red: fr. black, not bloomy, 5–8 mm. across. Fl.v; fr.vii–viii. (about 8 or 10 days earlier than the following species). B.B.2:702. (*V. corymbosum* var. *a.* Gray.—Black High B.) Me. to Ont. and N. C. Intr. before 1898. Zone IV.—Var. **leucocóccum** Deane. Fr. greenish or yellowish white, translucent. Intr. 1925.

9. **V. corymbósum** L. Highbush Blueberry. Shrub to 4 m., with spreading brs.; young brts. yellow-green, warty: lvs. ovate to elliptic-lanceolate, 3–8 cm. long, acutish, entire, half-grown at flowering time: fls. in dense clusters; calyx usually glaucous; corolla cylindric-urceolate to narrow-ovoid, 6–10 mm. long, white or pinkish: fr. blue-black, bloomy, 7–10 mm. across, edible. Fl.v; fr.vii–viii. Em.454,t(c). B.S.2:625. B.C.6:3422. Gn.M.34: 156. S.L.415(h). (Swamp B.) Me. to Minn., s. to Fla. and La.; in swampy and moist soil. Intr. 1765. Zone IV.—Var. **amoènum** Gray. Lvs. bright green on both sides, ciliate-serrulate. B.M.3433(c). B.R.400(c). L.B.774(c). (*V. a.* Ait.) Intr. 1765.—Var. **pállidum** Gray. Lower: lvs. pale and glaucescent, sometimes pubescent beneath, ciliate-serrulate. B.M.3428(c). B.B.2: 700. (*V. p.* Ait.) Intr. 1772.—Handsome shrub, beautiful in autumn when the lvs. turn bright scarlet and partly orange.

10. **V. vacíllans** Soland. Dryland B. Shrub to 1 m.; brts. glabrous, yellow-green: lvs. oval to obovate, 2.5–4.5 cm. long, obtuse or acutish, dull or pale green above, glaucous beneath, entire or slightly ciliolate-serrulate: fls. in dense clusters, usually at the end of the brts.; calyx usually reddish; corolla short-cylindric, 5–8 mm. long, white, often tinged red: fr. blue, bloomy, 6–8 mm. across, sweet. Fl.v; fr.vii–viii. Em.454,t(c, as *V. virgatum*). B.B. 2:702. (Low B.) Me. to Mich., s. to Ga. and Mo.; in dry sandy and rocky places. Cult. 1878. Zone IV.—Var. **crinitum** Fern. Brts. and lvs. beneath pubescent.

V. v. × *pennsylvanicum* = **V. Dobbínii** Burnham. Similar to *V. vacillans*, but lvs. elliptic, serrulate, green, slightly hairy on midrib beneath: fr. blue with little or no bloom. Occasionally with the parents.

11. **V. pennsylvánicum** Lam. Lowbush Blueberry. Low shrub to 0.5 m.; brts. glabrous or slightly hairy: lvs. narrow-elliptic to oblong-lanceolate, 2–3.5 cm. long, acute at ends, serrulate with bristle-pointed teeth, green and lustrous on both sides, glabrous or nearly so: fls. short-pediceled in short and dense clusters; calyx-lobes acute; corolla cylindric-campanulate, slightly contracted at the mouth, 6–7 mm. long, greenish white: fr. bluish black and bloomy, 6–12 mm. across, varying to black or red, rarely white (f. *leucocarpum* Deane). Fl.iv–v; fr.vii–viii. B.M.3434(c). G.O.t.34(c). Em.456, t(c). Nfld. to Sask., s. to Va., Ill. and Wisc. Intr. 1772. Zone II or III.—Var. **nígrum** Wood. Low Black B. Lvs. firmer, bluish green, glaucous beneath: fr. black, without bloom. B.B.2:702. (*V. n.* Brit.) Me. to N. Y., Pa. and Mich.—Var. **angustifòlium** Gray. Dwarf form: lvs. lanceolate, 7–20 mm. long and 3–7 mm. wide. B.B.2:701. (*V. a.* Ait.) Northern form, s. to mts. of N. H. and N. Y.—Var. **myrtilloìdes** Fern. Brts. pubescent: lvs. elliptic-lanceolate, with bristle-tipped teeth, pubescent beneath, at least on midrib. (*V. m.* Michx.) Lab. to Hudsons Bay and Mass.

12. **V. hirtum** Thunb. Shrub to 0.5, rarely to 1 m., with spreading brs.;

young brts. pubescent, slightly angled: lvs. ovate or elliptic to ovate-lanceolate, 1.5–3.5 cm. long, acute or acuminate, broad-cuneate to rounded, serrulate, green on both sides and sparingly pilose or glabrous except on midrib: infl. 1–3-fld.; pedicels nodding, longer than calyx-tube; lobes semi-orbicular, shorter than tube; corolla campanulate, 5–6 mm. long, red; stamens as long as corolla, often slightly exserted: fr. blue, 5–7 mm. across (? or dark red). Fl.v–vi; fr.ix. N.T.1:177. Japan. Intr.?—Var. **Smàllii** Maxim. Taller, to 1.5 m.; brts. glabrous or nearly so; lvs. 3–6 cm. long, usually elliptic-oblong to oblong-lanceolate, slightly pubescent or glabrous: fr. black, 6–10 mm. across. N.T.1:178. Japan. Intr. 1915. Zone V.

A closely related species similar to var. *Smallii* but with red fr. is **V. Buèrgeri** Miq. Shrub to 1 m.: lvs. more remotely and less finely serrulate, usually glabrous, sometimes pubescent beneath, chiefly on midrib: fr. subglobose to ellipsoid. N.T. 1:179, 191. N.K.8:t.26. (*V. koreanum* Nakai.) Japan, Korea. Intr. 1917 (from Korea). Zone V.

13. **V. praèstans** Lamb. Low shrub with creeping rootstock and upright glabrous simple or little branched stems to 15 cm.: lvs. broad-elliptic to obovate, 2.5–5 cm. long, obtuse or acutish, mucronate, narrowed into a slender petiole 3–10 mm. long, remotely and minutely serrulate, green on both sides, glabrous: fls. 1–3, on puberulous peduncles with leaf-like bracts; pedicels with 2 small lanceolate bractlets below the calyx; sepals semi-orbicular, ciliate; corolla campanulate, 5–6 mm. long, with rather large ovate lobes, white, tinged pinkish: fr. 10–12 mm. across, bright red, lustrous, fragrant, sweet. Fl.vi; fr.viii–ix. N.T.1:185. Trans. Linn. Soc. 10:t.9. Kamtch., Saghal., N. Japan. Intr. 1914. Zone V (or III?)—Very distinct low shrub, in habit similar to *Gaultheria procumbens*, the large frs. of strawberry-like fragrance.

14. **V. myrsinìtes** Lam. Evergreen Blueberry. Evergreen shrub decumbent or upright, to 0.6 m., glabrous or nearly so: lvs. obovate to oblong-lanceolate or spatulate, 1–3 cm. long, entire or denticulate, lustrous above, veiny beneath and glabrous or puberulent: fls. in short racemes; bracts and calyx-lobes acute: corolla cylindric, 6–8 mm. long, white; fr. 5–8 mm. across, blue-black. Fl.iv–v; fr.v. B.M.1550(c). Va. to Fla. Cult. 1813. Zone VII or VIII.

Sect. 4. Vitis-idaea W. Koch. Corolla campanulate; anthers awnless; filaments pubescent: fls. in clusters from distinct buds; ovary 4–5-celled: lvs. evergreen. (*Vitis-idaea* Moench.)

15. **V. ovàtum** Pursh. Evergreen shrub to 4 m.; brts. pubescent: lvs. numerous, ovate to oblong-ovate, 1–3 cm. long, acute, rounded to subcordate at base, serrulate, bright green on both sides, glabrous: fls. in short racemes; calyx-lobes acute; corolla campanulate, 6 mm. long, white or pink, with 5 short lobes: fr. black, 8 mm. across, with or without bloom, acid. Fl.iv–v; fr.vii–viii. B.M.4732(c). B.R.1354(c). L.B.1605(c). B. C. to C. Calif. Intr. 1826. Zone VII or VIII.

16. **V. Vitis-idaèa** L. Cowberry. Low evergreen shrub, with creeping rootstock and upright stems to 0.3 m. high: lvs. oval to obovate, 1–3 cm. long, obtuse or emarginate, dark green and lustrous above, pale and black-dotted beneath, coriaceous: fls. in short subterminal racemes, nodding; corolla campanulate, 4-lobed, 6 mm. long, white or pinkish: fr. dark red, acid and bitter, 8–10 mm. across. Fl.v–vi; fr.viii–x. R.I.17:t.117,f.1(c). F.D.20:t. 2038(c). B.C.6:3424. N.K.8:t.24. (*Vitis-idaea punctata* Moench, *Vitis-idaea V.* Brit.) Eu., N. Asia. Cult. 1789. Zone V.—Var. **màjus** Lodd. Lvs. and frs. larger. B.C.616(c).—Var. **minus** Lodd. Mountain Cranberry. Dwarf,

forming dense mats to 10, rarely 20 cm. high; lvs. 5–18 mm. long: corolla pink or red. L.B.1023(c). B.B.2:697. Lab. and Mass. to Alaska and B. C. Cult. 1825. Zone I.

V. v. × *Myrtillus* = **V. intermèdium** Ruthe. Evergreen or nearly evergreen; brts. slightly angled: lvs. serrate, without black dots beneath: fr. dark violet. R.I.17:t.118,f.4,5(c). D.H.1:338. Jour. Linn. Soc. Bot.24:125,t. Occasionally with the parents. Intr. 1870.

Sect. 4. Euvaccinium Gray. Corolla urceolate; anthers awned; filaments glabrous; fls. axillary, 1–4, at base of young brts.; ovary 4–5-celled: lvs. deciduous.

17. **V. uliginòsum** L. Bog Bilberry. Low shrub to 0.5 m.; brts. terete, glabrous or puberulous: lvs. subsessile, oval or obovate, 1–2.5 cm. long, obtuse or retuse, entire, pale and glaucous on both sides, slightly pubescent and reticulate beneath: fls. 1–4, subsessile; corolla 4 mm. long, pink or white: fr. blue-black, bloomy, 6 mm. across, sweet. Fl.v–vi; fr.viii–ix. R.I.17:t. 117,f.3,4(c). F.D.20:t.2037(c). G.H.t.42(c). N.K.8:t.25. N. Eu., N. Asia, and N. Am., s. to the mts. of N. H. and N. Y. Cult. 1789. Zone I.

A related species is **V. occidentàle** Gray. Shrub to 1 m.: lvs. oblong-obovate to oblanceolate, slightly reticulate and slightly paler beneath: fr. 4–5 mm. across. B. C. to Mont., Utah and Calif. Intr. 1918. Zone V?

18. **V. caespitòsum** Michx. Dwarf Bilberry. Dwarf tufted shrub to 0.3 m.; brts. terete, glabrous: lvs. obovate to oblanceolate or spatulate, 1–4 cm. long, obtuse or acutish, cuneate, serrulate, bright green on both sides, lustrous above: fls. solitary, short-pediceled; corolla ellipsoid, 5-, rarely 4-toothed, 5 mm. long, white or pink: fr. black, bloomy, 6 mm. across, sweet. Fl.v; fr.viii. B.M.3429(c). Hooker. Fl. Bor. Am. t.126. D.H.1:333. B.B. 2:699. Lab. to Alaska, s. to N. H., N. N. Y., Mich., Colo. and Calif. Intr. 1823. Zone I?

A closely related species is **V. deliciòsum** Piper. Shrub to 0.3; lvs. obovate or oval, remotely serrulate, thickish, glaucescent beneath; corolla subglobose. Wash. Intr. 1920. Zone V.

19. **V. Myrtíllus** L. Whortleberry. Shrub to 0.5 m.; brts. sharply angled, glabrous: lvs. very short-stalked, ovate or elliptic, 1–3 cm. long, acute, sometimes rounded or subcordate at base, serrate, conspicuously veined beneath: fls. solitary, short-pediceled; calyx-limb nearly entire; corolla globose-ovoid, 6 mm. long, usually pinkish: fr. black, bloomy, 8 mm. across, sweet. Fl.v; fr.viii–ix. R.I.17:t.118,f.1,2(c). F.D.20:t.2036(c). G.H.t.41(c). N.D.2:t.29(c). Eu., N. Asia. Cult. 1789. Zone IV?—Var. **leucocárpum** Dum. Fr. white.

V. M. × *Vitis-idaea* = *V. intermedium;* see under No. 16.

20. **V. membranàceum** Dougl. Upright shrub to 1.5 m.; brts. slightly angled: lvs. ovate to oblong-ovate, 2–7 cm. long, acute or obtusish, serrulate, bright green and glabrous or nearly so, reticulate beneath, thin: fls. solitary, nodding; pedicel 5–15 mm. long, upright in fr.; calyx-limb nearly entire: corolla depressed-globose to globose-ovoid, 6 mm. across, greenish or purplish: fr. black, 6–8 mm. across, acid. Fl.vi; fr.vii–ix. B.M.3447(c). D.H.1:331. B.B.2:699. (*V. myrtilloides* Hook., not Michx., *V. macrophyllum* Piper.) Mich. to Mont., Ore. and B. C. Intr. 1828. Zone V.

A related species is **V. scopàrium** Leib. Grouseberry. Low shrub to 20 cm.: lvs. ovate to elliptic-ovate, 4–10 mm. long, serrulate, light green: corolla 3 mm. long, globose-urceolate, white: fr. red, 5 mm. across. (*V. erythrococcum* Rydb., *V. microphyllum* Rydb.) B. C. and Alb. to Calif. and Colo. Intr. 1904. Zone V.

21. **V. ovalifòlium** Smith. Slender shrub to 4 m.; brts. sharply angled, glabrous: lvs. oval to oblong, 2.5–5 cm. long, obtuse, sometimes mucronulate, broad-cuneate or rounded, entire, pale green above, glaucous beneath, glabrous: fls. solitary, nodding; pedicels 5–12 mm. long, calyx-limb 10-toothed;

corolla ovoid-urceolate, about 8 mm. long: fr. bluish purple, bloomy, about 1 cm. across, rather acid. Fl.VI; fr.VII–IX. Hooker, Fl. Bor. Am. t.127. B.B.2:700. D.H.1:330. Que. to Mich., Alaska and Ore. Intr. 1880. Zone IV.

Closely related species are: **V. axillàre** Nakai. Very similar to the preceding species: lvs. usually rounded at base; pedicels shorter; calyx 5-toothed; corolla globose-urceolate. N.T.1:188. N. E. Asia. Intr. ?—**V. parvifòlium** Sm. Shrub to 3 m.: lvs. broad-oval to obovate, 6–12 mm. long, obtuse, dull green; calyx-limb 5-toothed; corolla subglobose, pinkish white: fr. red, 6 mm. across, acid. Hooker, Fl. Bor. Am.t.128. D.H.1:332. Proc. Iowa Acad. Sci.23:t.28. Alaska to N. Calif. Intr. 1881. Zone V.

An evergreen species belonging in the sect. EPIGYNIUM which differs from Sect. 5 chiefly in the 1- or few-ovuled cells of the ovary, racemose infl. and evergreen lvs. is **V. urceolàtum** Hemsl. Shrub to 2 m.: lvs. elliptic-ovate to oblong-ovate, 6–9 cm. long, subsessile, long-acuminate, glabrous: fls. broad-urceolate, about 5 mm. long, pink, in axillary racemes; anthers partly exserted; bracts large, ovate, caducous: fr. globose, 6–7 mm. across, black. W. China. Intr. 1910. Zone VIII?

Sect. 6. OXYCOCCOIDES Benth. & Hook. Corolla deeply 4-cleft with revolute linear-oblong lobed; ovary 4-celled; fls. solitary, axillary, nodding, jointed with the pedicel: lvs. deciduous. (*Hugeria* Small.)

22. **V. erythrocárpum** Michx. Shrub to 2 m., with spreading brs.; brts. pubescent: lvs. short-petioled, ovate to oblong-lanceolate, 3–7 cm. long, acuminate, rounded at base or broad-cuneate, setose-serrulate, green on both sides; slightly pubescent on the veins above and beneath: pedicels about 1 cm. long; corolla about 1 cm. long, pale red: fr. about 6 mm. across, bright red at first, later purplish red, acid. Fl.V; fr.IX. B.M.7413(c). B.B.2:705. (*Oxycoccus erythrocarpus* Pers., *Hugeria erythrocarpa* Small.) Va. to Ga. Intr. 1806. Zone V.

23. **V. japónicum** Miq. Shrub to 1 m.; brts. angular, glabrous: lvs. very short-petioled, ovate to ovate-oblong, 2–6 cm. long, acute to acuminate, rounded or subcordate at base, serrulate with bristly teeth, bright green and somewhat rugulose above, glaucescent beneath, quite glabrous: pedicels 1–1.5 cm. long; corolla 8 mm. long, pinkish: fr. sometimes pyriform, 5–7 mm. across, scarlet, pendulous. Fl.VII; fr.IX. N.K.8:t.20. N.T.1:167. (*Oxycoccoides japonicus* Nakai.) Japan, Korea. Intr. 1892. Zone V.—Var. **sínicum** Rehd. Lvs. ovate-oblong to ovate-lanceolate, smaller, pubescent on and along the midrib beneath near base. China. Intr. 1907. Zone VI.

Sect. 7. OXYCOCCUS Hook. Corolla 4-parted to the base or nearly to the base, with revolute linear-oblong lobes; ovary 4-celled: fls. on slender pedicels, axillary or in racemes: trailing evergreen shrubs. (*Oxycoccus* Adans., *Schollera* Roth.)

24. **V. Oxycóccus** L. SMALL CRANBERRY. Creeping, with filiform stems to 0.5 m. long: lvs. ovate to oblong-ovate, 4–10 mm. long, acute, strongly revolute, dark green above, glaucous beneath: fls. 1–4 in a terminal raceme, on slender pedicels 1.5–2.5 cm. long, with 2 small colored bracts near the middle: petals 5–6 mm. long, recurved; filaments half as long as anthers: fr. globose to pyriform, 6–8 mm. across, red. Fl.V–VII; fr.IX–XI. R.I.17:t. 118,f.6(c). F.D.20:t.2039(c). B.B.2:704. (*Oxycoccus palustris* Pers., *O. Oxycoccus* MacM.) N. Eu., N. Asia and N. Am., s. to Pa., Mich. and Wisc. Cult. 1789. Zone I.—Var. **intermèdium** Gray. Coarser: lvs. 6–15 mm. long, acute or obtuse, slightly revolute: fls. 2–10 on a longer rachis; petals 6–8 mm. long: fr. 8–10 mm. across. Nfld. to B. C., s. to Mich. and to N. C. in the mts.; also N. Asia.—Fr. used for jellies and preserves.

25. **V. macrocárpum** Ait. LARGE CRANBERRY. Creeping, with slender stems to 1 m. long, ascending at ends: lvs. elliptic-oblong to oblong, 6–18 mm. long, flat or slightly revolute, slightly whitened beneath: pedicels 1–10,

from an elongated rachis terminated by a leafy shoot; pedicels with 2 leaf-like bracts near apex; petals 6–10 mm. long; filaments scarcely ⅓ the length of the anthers: fr. 1–2 cm. across. Fl.VI–VIII; fr.IX–XI. B.M.2586(c). Em. 456,t(c). Gt.21:1,t(c). M.N.2:t.28(c). (*Oxycoccus macrocarpus* Pers.—American C.) Nfld. to Sask., s. to N. C., Mich. and Minn. Intr. 1760. Zone II.—Cult. for its fr., which is extensively used for jellies and preserves.

Fam. 89. **DIAPENSIACEAE** Lindl. DIAPENSIA FAMILY

Suffruticose plants or perennial herbs, evergreen: lvs. alternate or opposite, simple, estipulate: fls. perfect, 5-merous, gamopetalous or petals separate, solitary or racemose; stamens 5, adnate to corolla or sometimes monadelphous; anthers opening by longitudinal slits; staminodes sometimes present; disk absent: fr. a loculicidal caps. with several or numerous seeds; ovary 3-celled; style 1, with 3-lobed stigma.—Six genera with about 10 circumpolar, s. to Ga. and to Himal. in Asia.

A. Fls. on a 1-fld. peduncle: densely tufted plant.....1. *Diapensia*
AA. Fls. sessile: creeping plant.....2. *Pyxidanthera*

1. **DIAPÉNSIA** L. Evergreen suffruticose plants forming dense convex tufts: lvs. crowded, narrow-spatulate, mostly opposite, entire: fls. solitary on a terminal peduncle, 3-bracted under the calyx; sepals coriaceous, broad; corolla campanulate, 5-lobed with rounded lobes: filaments broad, adnate to the corolla up to the sinus; anther-cells ovoid, divergent below, obtuse: caps. inclosed in the calyx, cartilaginous; cells few-seeded. (Ancient Greek name of uncertain meaning.) Four species in N. Am., N. Eu. and Asia.

D. lappónica L. Tufts, up to 10 cm. high: lvs. obtuse, 5–15 cm. long, obtuse: fls. white, 1.5–2 cm. across, on a peduncle finally 1.5–3 cm. long: fr. ovoid, 4–6 mm. long. Fl.VI–VII. B.M.1108(c). E.P.IV.1:82. S.H.2:f.370a-e. Circumpolar, in N. Am. s. to alpine summits of N. H. and N. Y. Intr. 1801. Zone I.—Interesting plant adapted for the alpine rock garden.

2. **PYXIDANTHÈRA** Michx. Evergreen prostrate and creeping plant: lvs. mostly alternate, narrow-oblanceolate: fls. solitary, sessile; sepals thin, obtuse; corolla campanulate, 5-lobed with broad lobes; stamens short, inserted at base of sinus; anthers short, opening transversely, pointed at base; ovary 3-celled: caps. globose. (Greek *pyxis*, small box, and *anthera;* the anthers opening as if by a lid.) One species.

P. barbulàta Michx. FLOWERING MOSS. Lvs. awl-pointed, 3–8 mm. long, slightly hairy near base: fls. 4–6 mm. broad, white or pink. Fl.IV–V. B.M. 4592(c). M.M.8:t.33(c). Gn.27:209. B.B.2:583. N. J. to N. C.; in sandy pine barrens. Intr. 1806. Zone VI.—Attractive low plant dotted with white or pink fls. in early spring; adapted for the rock garden; prefers moist sandy or gravelly soil and full sun.

Fam. 90. **MYRSINACEAE** Lindl. MYRSINE FAMILY

Trees or shrubs: lvs. usually alternate, coriaceous, glandular-dotted, estipulate: fls. perfect or unisexual, regular; calyx 4–5-parted, persistent; corolla gamopetalous, 4–5-lobed, rarely petals distinct; stamens 5, mostly epipetalous, separate or monadelphous; staminodes often present; ovary superior or inferior, 1-celled, with basal or central placenta; ovules few or numerous; style and stigma 1; fr. usually a drupe, 1- or few-seeded, rarely many-seeded; seeds albuminous. More than 30 genera with about 550 species, chiefly trop.

ARDÍSIA Swartz. Evergreen trees or shrubs; lvs. entire or dentate: fls. usually in cymes or panicles; corolla rotate, 5-, rarely 4- or 6-parted, the divisions dextrorsely convolute in bud; calyx 4–6-parted, small, persistent; stamens inserted on throat of corolla, with very short filaments and large sagittate anthers opening by longitudinal slits: fr. a 1-seeded drupe, with thin flesh. (Greek *ardis*, point; referring to the pointed anthers.) About 200 species, chiefly in trop. and subtrop. regions.

A. japónica Thunb. Upright shrub to 0.4 m.; lvs. crowded at end of stems, elliptic, 4–10 cm. long, acute at ends, lustrous bright green, glabrous except the puberulous midrib; petiole 5–10 mm. long, puberulous: racemes 2–6-, rarely many-fld. and paniculate; corolla about 1.2 cm. across, with spreading ovate acute lobes, white: fr. globose, 6 mm. across, red. Fl.VIII–IX; fr.IX–XI. B.R.1892(c). N.T.1:202. S.H.2:f.371a-e. (*Bladhia j.* Thunb.) Japan, China. Intr. about 1830. Zone VII or VIII.—Handsome low evergreen shrub with attractive red berries.

The related family of **PRIMULACEAE** which differs chiefly in its dehiscent many-seeded capsular fr. contains mostly herbs and only few suffruticose plants of which none seem to be in cult. A suffruticose genus worth trying within our area is **Dionýsia** Fenzl with about 15 species from the high mts. of Persia and Afghanistan; the species are plants of the habit of Diapensia with salver-shaped usually yellow fls.; they would find their proper place in the alpine rock garden.

Fam. 91. PLUMBAGINACEAE Lindl. LEADWORT FAMILY

Herbs or shrubs: lvs. alternate, linear to elliptic, usually entire: fls. perfect, regular, in panicles, spikes or heads, 5-merous; calyx scarious, persistent, plicate, angled or winged, often colored, bracted at base: corolla gamopetalous or petals nearly separate, convolute in bud; stamens 5, epipetalous; ovary superior, 1-celled, with 1 basal ovule; styles or stigmas 5: fr. a caps. or utricle surrounded by the calyx.—About 10 genera with 250 species chiefly in the Mediterr. Region and C. Asia.

CERATOSTÍGMA Bge. Shrubs or perennial herbs: lvs. alternate, lanceolate to obovate, ciliate: fls. usually in terminal and axillary bracted heads; calyx tubular, 5-parted, with narrow lobes, 10-nerved at base, eglandular: corolla salver-shaped with long tube and spreading obovate lobes, rose or violet; stamens inserted at the middle of the corolla-tube; style slender, with 5 stigmas: caps. 5-valved, inclosed in the calyx. (Greek, *keras*, *keratos*, horn and *stigma;* referring to the shape of the stigmas.) Syn. *Valoradia* Hochst. About 8 species in C. Africa, Himal. and W. China.

C. Willmottiánum Stapf. Much-branched shrub to 1.5 m.; brts. grooved, strigillose; young brts. scaly at base: lvs. subsessile, rhombic or rhombic-obovate to rhombic-lanceolate, 3–5 cm. long, acute, gradually narrowed at base, ciliate, strigose above, more densely beneath and glandular-scurfy: fl.-heads surrounded by stiff lanceolate acuminate bracts rigidly ciliate, 8–14 mm. long; corolla salver-shaped, tube rosy-red, limb bright blue, 1.5–2 cm. across, the lobes truncate-obovate; anthers purple; style exserted. Fl.VII–XI. B.M.8591. W. China. Intr. 1908. Zone VII?—Loosely branched rather sparingly leafy shrub with handsome bright blue fls. in summer and autumn.

A closely related species is **C. mínus** Stapf. Smaller plant, with generally obovate obtuse and mucronulate lvs. and smaller terminal and axillary heads forming spikes at end of the brts. (*C. Polhillí* Bulley.) W. China. Intr. about 1900.—The best known species, **C. plumbáginoïdes** Bge. (*Plumbago Larpentae* Lindl.), is an herbaceous perennial to 0.3 m. tall with deep blue fls. in dense heads or clusters. B.M.4487(c). Add.5:t.183(c).

Fam. 92. SAPOTACEAE Dumort. SAPODILLA FAMILY

Trees or shrubs with milky juice: lvs. alternate, entire, more or less coriaceous, exstipulate: fls. usually perfect, regular, axillary; sepals 5, or in 2 whorls of 2, 3 or 4; corolla gamopetalous, lobes as many as sepals or twice as many, imbricate, sometimes with appendages; stamens as many as corolla-lobes and opposite them; staminodes often present; ovary superior, 4- to many-celled; 1 basal ovule in each cell; style and stigma 1: fr. a drupe.—More than 30 genera with about 400 species chiefly in trop. and subtrop. regions.

BUMÈLIA Swartz. Deciduous or evergreen trees and shrubs with milky or gummy sap and very hard wood; brs. often thorny; winter-buds ovoid, small, with several outer scales: fls. minute, usually perfect, in axillary clusters, slender-pediceled; calyx 5-lobed, persistent, with obtuse lobes; corolla campanulate, 5-lobed, lobes longer than tube, with a small appendage on each side; stamens 5, adnate to corolla, with short filaments, alternating with petaloid staminodes; ovary 5-celled, pubescent: fr. 1-seeded, berry-like. (Ancient Greek name of an ash tree.) About 25 species in Am. from the S. States to the W. Indies and Brazil.

A. Lvs. beneath, pedicels and calyx pubescent.....1. *B. lanuginosa*
AA. Lvs., pedicels and calyx glabrous.....2. *B. lycioides*

1. **B. lanuginòsa** Pers. CHITTAMWOOD. Shrub or small tree to 8 m., with rigid spreading brs. usually spiny; young brts. tomentose: lvs. oblong-obovate to cuneate-obovate, 3–8 cm. long, rounded and often apiculate at apex, cuneate, lustrous dark green above, with rusty or pale woolly tomentum beneath, subcoriaceous, falling late in autumn or during the winter in the S.; petiole 4–16 mm. long: fls. white, 3 mm. across; in many-fld. clusters; pedicels 2–8 mm. long: fr. ellipsoid or obovoid, about 1 cm. long, black. Fl.VI–VII; fr.X. S.S.5:t.247. H.H.376. B.B.2:720. (Shittimwood, Gum Elastic, Woolly Buckthorn.) Va. to Ill., Mo., Tex. and Fla. Intr. 1806. Zone (V).—Like the following of little ornamental value; the lvs. remaining green until very late in autumn.

The related **B. tènax** Willd. differing chiefly in its silky lustrous pubescence, is probably not hardy within our area.

2. **B. lycioìdes** Gaertn. f. SOUTHERN BUCKTHORN. Shrub or small tree to 8 m., with spreading unarmed or spiny brs.: lvs. elliptic to oblanceolate, 5–13 cm. long, acute or sometimes acuminate, cuneate, bright green above, lighter green beneath and silky-villous at first usually soon glabrous, reticulate, firm, falling late in autumn: petiole 1–2 cm. long, slender: fls. in many-fld. clusters; pedicels 4–10 mm. long, glabrous: fr. subglobose or ellipsoid, about 1 cm. long, black. Fl.VI–VIII; fr.X. S.S.5:t.248. N.S.3:t.91(c). Horticulturist,13:420,t(c). Va. to Ill. and Mo., s. to Fla. and Tex. Intr. 1758. Zone (V).

Fam. 93. EBENACEAE Juss. EBONY FAMILY

Trees or shrubs with watery juice and hard wood: lvs. alternate, entire, exstipulate: fls. dioecious or polygamous, regular, axillary, articulate with the 2-bracteolate pedicel; calyx 3–7-lobed, persistent; corolla gamopetalous, 3–7-lobed, lobes involute in bud; disk wanting; stamens 2 to 3 times as many as corolla-lobes, inserted on the tube, usually some imperfect ones in the pistillate fl.; anthers introrse; ovary several-celled, with usually 2 suspended ovules in each cell; styles 2–8, distinct or united at base: fr. a several-seeded berry; seeds with copious albumen; embryo small, with large foliaceous cotyledons.—About 6 genera with nearly 300 species chiefly trop.

DIOSPŸROS L. Persimmon. Deciduous or evergreen trees and shrubs; winter-buds ovoid, with about 3 outer scales, the terminal bud wanting: fls. white or whitish, the pistillate usually solitary; the staminate ones cymose; calyx and corolla usually 4-lobed, rarely 3–7-lobed; stamens usually 8–16, ovary 4–12-celled; styles 2–6: fr. a large juicy berry, 1 to 10-seeded, usually with the enlarged calyx at base; seeds large, flattened. (Greek *Dios*, Jove's, and *pyros*, grain; in allusion to the edible fr.) About 200 species chiefly in trop. and subtrop. regions.

A. Lvs. acuminate, large.
  B. Young brts. glabrous or grayish pubescent: fr. pale orange or yellowish, rarely nearly black, 1–3.5, rarely to 7 cm. across.
    C. Petioles 1.5–2 cm. long: fls. 1–1.5 cm. long ..... 1. *D. virginiana*
    CC. Petioles 1–1.5 cm. long: fls. 5–10 mm. long ..... 2. *D. Lotus*
  BB. Young brts. brownish pubescent: fr. orange-red to golden-yellow, 4–7 cm. across. 3. *D. kaki*
AA. Lvs. obtuse, 2–6 cm. long ..... 4. *D. armata*

1. **D. virginiàna** L. Common P. Tree to 15, rarely to 30 m., with round-topped head and spreading, often pendulous brs.; bark dark, deeply divided into square scaly thick plates: lvs. ovate to elliptic, 6–14 cm. long, usually rounded at base, lustrous dark green above, paler beneath and usually glabrous at maturity: corolla campanulate, with 4 reflexed lobes; staminate fls. usually in 3's, about 1 cm. long, with 16 stamens; the pistillate short-stalked, solitary, 1.5 cm. long, with 4 2-lobed styles: fr. globose or obovoid, 2–3.5 cm. across, yellowish to pale orange, often with red cheek, edible; seeds oblong, about 1 cm. long. Fl.v–vi; fr.ix–xi. Add. 3:t.85(c). S.S.6:t.252, 253. G.F. 8:265. Gn.57:146a. M.M.4:21(b). G.W.16:230(h). S.L.186(h). Conn. to Fla., w. to Kans. and Tex. Intr. 1629. Zone V.—Var. **platycârpa** Sarg. Lvs. broader, rounded or cordate at base, pubescent beneath: fr. depressed-globose, 4–7 cm. across. Mo. and Ark. Intr. 1904. Zone V.—Handsome tree with dark green lustrous foliage changing little in autumn; sometimes planted for its edible frs.

2. **D. Lotus** L. Date-plum. Round-headed tree to 14 m.; brts. gray, pubescent: lvs. elliptic to oblong, 6–12 cm. long, rounded to broad-cuneate at base, pubescent above at first, later usually glabrous, pubescent beneath at least on the veins: fls. reddish or greenish white; staminate fls. 2–3, about 5 mm. long, with 16 stamens; pistillate subsessile, 8–10 mm. long: fr. globose, about 1.5 cm. across, yellow, often bloomy and sometimes becoming blue-black. Fl.vi; fr.x–xi. S.I.1:t.79(c). R.I.17:t.38(c). N.D.6:t.27(c). Gn.32: 68. A.G.12:460. U.S.Im.113:t.(fr.). W. Asia to N. W. Himal., China and Japan. Cult. 1597. Zone (V).—Var. **glâbra** Mak. Brts. and lvs. glabrous. Japan.—Similar to the preceding species; fr. of inferior quality.

3. **D. kâki** L. f. Kaki P. Round-headed tree to 14 m.: lvs. elliptic-ovate to oblong-ovate or obovate, 6–18 cm. long, usually broad-cuneate, soon glabrous and lustrous, dark green above, pubescent beneath; petiole 1–1.5 cm. long, pubescent: fls. yellowish white; staminate fls. in 3's, about 1 cm. long, with 16–24 stamens; pistillate 1.5–1.8 cm. long; styles divided to base, pubescent: fr. ovoid to depressed-globose, 3.5–7 cm. across, orange to bright yellow, edible. Fl.vi; fr.viii–xi. B.M.8127(c). N.K.13:t.7. G.C.III.41:22. Gn.49:171. Gn.M.34:102(h). U.S.Inv.38:t.10(h). (*D. chinensis* Bl., *D. Schitse* Bge., *D. Roxburghii* Carr.) Cult. in China and Japan for its fr.; intr. to Eu. in 1796, but little known before 1870. Zone VIII.—Var. **costâta** André. Fr. large, depressed-globose, with 4 furrows, orange-red. R.H.1870: 410,t(c). G.C.III.9:171;13:51. Gn.49:171.—Var. **Mazèlii** Mouillef. Fr. depressed-globose, with 8 furrows, orange-yellow. R.H.1874:70,t(c).—Var.

silvéstris Mak. Brts. and petioles more densely fulvous-pubescent, lvs. usually smaller, broad-ovate to lanceolate, pubescent beneath: fls. smaller; ovary pubescent: fr. 1.5–5 cm. across, golden-yellow. China, Korea. Intr. 1907. Zone VII or VIII? This is the wild type of the cult. kaki.

4. **D. armàta** Hemsl. Half-evergreen or deciduous tree, to 8 m., with wide-spreading spiny brs.; young brts. tomentose: lvs. short-petioled, elliptic or obovate to oblong, 1.5–6 cm. long, obtuse, cuneate, dark lustrous green above, minutely pubescent beneath; staminate fls. in small corymbs, creamy white, fragrant, tomentose, 4–5 mm. long: fr. subglobose about 2 cm. across, yellow, setose, on a pedicel about 1 cm. long. Fl.v. C. China. Intr. 1904. Zone VIII.

Fam. 94. SYMPLOCACEAE Miers. SWEETLEAF FAMILY

Contains only the following genus.

SÝMPLOCOS Jacq. SWEETLEAF. Deciduous or evergreen trees or shrubs; winter-buds usually several, superposed, small, with several outer scales: lvs. alternate, simple, estipulate: fls. perfect or sometimes unisexual, regular, in axillary clusters or in racemes or panicles; calyx with 5, rarely 4 imbricate lobes; corolla 5- or 10-, rarely 4-lobed, sometimes divided nearly to the base, lobes imbricate; stamens 15 to many, rarely 4–10, often in several series, distinct or united in fascicles, usually adnate to the corolla; ovary inferior or half-inferior, 2–5-celled, with usually 2 ovules in each cell; style 1, with 1–5 stigmas: fr. a drupe with a 1–5-seeded stone. (Greek *symplokos*, connected, in reference to the often united stamens.) Includ. *Hopea* L., *Bobua* DC., *Palura* Buch.-Ham. About 290 species widely distributed in trop. and subtrop. regions except Africa, in Am. n. to Del.

A. Lvs. sharply serrulate: fls. in panicles.....1. *S. paniculata*
AA. Lvs. obscurely toothed, half-evergreen: fls. in axillary cluster.....2. *S. tinctoria*

1. **S. paniculàta** Wall. ASIATIC S. Shrub or tree to 12 m., with slender spreading brs.; young brts. pubescent: lvs. short-petioled, elliptic or obovate to oblong-obovate, 3–7 cm. long, acute or acuminate, usually broad-cuneate, bright green and glabrous or nearly so above, conspicuously veined beneath and usually pubescent, rarely glabrous: fls. white, fragrant, 8–10 mm. across, with spreading elliptic-oblong, nearly distinct petals, in panicles 4–8 cm. long, terminal and axillary on short lateral brts.; stamens distinct, numerous; fr. ellipsoid, about 8 mm. long, bright blue; stone 1-seeded. Fl.v–vi; fr.ix. S.I.2:t.68(c). G.F.5:89. G.C.III.74:263;75:38,t(h). M.G.16:100(h),101. S. L.403(h). (*S. crataegoides* Buch.-Ham., *Palura p.* Nakai.) Himal. to China and Japan. Intr. 1875. Zone V.—Ornamental shrub with conspicuous white fls. in spring and attractive bright blue frs. in autumn.

A closely related species is **S. sínica** Ker. Lvs. elliptic, acute, pubescent on both sides: fls. in short panicles; calyx-teeth acute. B.R.710(c). E. China. Intr. 1823, apparently not now in cult. Zone VII or VIII?

2. **S. tinctòria** L'Hérit. SWEETLEAF. Half-evergreen shrub or small tree to 10 m.; young brts. rufous-pubescent or nearly glabrous: lvs. elliptic to oblong-oblanceolate, 7–15 cm. long, acute or acuminate, cuneate, obscurely serrate or nearly entire, lustrous above at maturity, paler and pubescent beneath, thickish, turning yellow-green in drying: fls. yellowish, 1 cm. across, fragrant, short-stalked, in sessile, dense axillary clusters; petals oblong, obtuse, nearly distinct; stamens numerous in 5 clusters; ovary glabrous, 3-celled: fr. ellipsoid, 6 mm. long, orange or brown. Fl.v; fr.viii–ix. S.S.6:t. 255, 256. (Horse-sugar.) Del. to Fla. and La. Cult. 1780. Zone VII.

A closely related species is **S. japónica** DC. (*Bobua j.* Miers) with racemose fls., pubescent ovary and oblong red fr. S.I.2:t.66(c). S.Z.1:t.24(c); probably not in cult.

Fam. 95. STYRACACEAE A. DC. STORAX FAMILY

Shrubs or trees usually with stellate pubescence: lvs. alternate, simple, exstipulate: fls. perfect, regular, solitary or in racemes or panicles; calyx 4–5-lobed or -cleft, free or adnate to ovary; petals 4–8, usually united only at base, imbricate or valvate; stamens twice as many or as many as petals: ovary superior or inferior; 3–5-celled below, with 1 or rarely several ovules in each cell; style with 1–5 stigmas: fr. dry or drupaceous; seeds albuminous. —Six genera and about 100 species from N. to S. Am., in E. Asia and the Mediterr. Region.

A. Ovary superior: fr. neither ribbed nor winged: fls. racemose or solitary ..... 1. *Styrax*
AA. Ovary inferior.
B. Fls. 4-merous fascicled: fr. 2- or 4-winged ..... 2. *Halesia*
BB. Fls. 5-merous, paniculate: fr. 5- or 10-ribbed ..... 3. *Pterostyrax*

1. STÝRAX L. Storax. Deciduous or evergreen trees; winter-buds usually several superposed, with 1 outer scale: lvs. short-stalked, entire or serrate: fls. white, in racemes or clusters terminal on short lateral brts., sometimes axillary and solitary; calyx campanulate, obscurely 5-toothed or truncate, persistent; corolla deeply 5-, rarely 8-lobed; stamens 10, rarely to 16, inserted at base of corolla; ovary superior, but adnate at base to calyx, 3-celled below, 1-celled above; style slender: fr. a usually subglobose dry or fleshy drupe with irregularly dehiscent pericarp; seeds 1–2, large, subglobose. (Ancient Greek name of *Styrax officinalis.*) About 100 species in trop. to warm-temp. regions of Am., Asia and Eu.—Ornamental shrubs with showy white fls.

A. Tube of corolla shorter than lobes.
B. Fls. in few-fld. clusters or racemes.
C. Pedicels about as long as calyx, puberulous.
D. Lvs. 3–9 cm. long ..... 1. *S. americana*
DD. Lvs. 1–2.5 cm. long ..... 2. *S. Wilsonii*
CC. Pedicels 1.5–2.5 cm. long, glabrous ..... 3. *S. japonica*
BB. Fls. in many-fld. racemes.
C. Lvs. tomentose or densely pubescent beneath, 6–20 cm. long.
D. Base of petiole not enlarged: infl. 6–10 cm. long ..... 4. *S. grandiflora*
DD. Base of petiole sheath-like and enclosing the bud: infl. 9–20 cm. long ... 5. *S. obassia*
CC. Lvs. glabrous or sparingly pubescent beneath, 5–14 cm. long.
D. Petiole 5–15 mm. long: corolla-lobes imbricate in bud ..... 6. *S. Hemsleyana*
DD. Petiole 1–3 mm. long: corolla-lobes valvate in bud ..... 7. *S. dasyantha*
AA. Tube of corolla longer than lobes: lvs. broad-elliptic to suborbicular, coarsely dentate. 8. *S. Shiraiana*

1. **S. americàna** Lam. Shrub to 3 m.; brts. nearly glabrous: lvs. elliptic to oblong, 2–7 cm. long, acute or acuminate, cuneate, entire or serrulate,, bright green and sparingly stellate-pubescent; petiole 2–4 mm. long: fls. 1–4, nodding, at end of short brts.; pedicels 6–12 mm. long, puberulous; calyx with minute triangular lobes; corolla about 1.5 cm. long, with spreading or reflexed oblong lanceolate lobes: fr. obovoid, 8 mm. long. Fl.IV–VI. B.M. 921(c). L.B.906(c). (*S. lævigata* Ait.) Va. to Fla., w. to Mo., Ark. and La. Intr. 1765. Zone (V).—Var. **pulverulénta** Perk. Lvs. sparingly stellate-pubescent above, more densely beneath: calyx and pedicels tomentose. B.B. 2:723. (*S. p.* Michx.) Va. to Fla. and Tex. Intr. 1794. Zone VII or VIII?

The Mediterranean **S. officinàlis** L. is probably not hardy within our area.

2. **S. Wilsònii** Rehd. Much-branched shrub to 3 m.; young brts. stellate-tomentose: lvs. rhombic-ovate to elliptic, 1–2.5 cm. long, obtuse or acutish, sparingly toothed or denticulate, usually entire below the middle, sparingly pubescent above, more densely so or tomentose beneath, or the first lvs. glabrate: fls. 3–5, short-stalked, 1.5–1.8 cm. across; calyx stellate-pubescent;

corolla-lobes oblong: fr. globose-ovoid, 8 mm. long. Fl.v–vi. B.M.8444(c). R.H.1914:33. G.M.56:369. W. China. Intr. 1908. Zone VII?—Handsome free-flowering shrub of dense habit, blooming when only a few inches high.

3. **S. japónica** Sieb. & Zucc. Shrub or small tree to 10 m., with slender spreading brs.; young brts. and lvs. with quickly disappearing stellate pubescence: lvs. broad-elliptic to elliptic-oblong, 2–8 cm. long, acute to acuminate, cuneate, remotely denticulate, glabrous except axillary tufts beneath: fls. 3–6, on short lateral brts., pendulous on slender stalks 2–3.5 cm. long; calyx glabrous, with 5 short rounded teeth; corolla with spreading elliptic-oblong lobes, 1.5–2 cm. across: fr. ovoid, 1.2–1.4 cm. long. Fl.vi–vii. S.Z.1:t.23(c). S.I.1:t.80(c). Add. 7:t.231(c). B.M.5950(c). G.C.III.65:279. Gn.76:588. S.L.402(h). China, Japan. Intr. 1862. Zone V.—Shrub with slender wide-spreading brs. exceedingly handsome when in bloom with its numerous, gracefully pendulous white fls.

4. **S. grandifòlia** Ait. Shrub to 4 m.; young brts. yellowish pubescent: lvs. elliptic to obovate, 6–18 cm. long, short-acuminate, usually narrowed toward the base, denticulate or nearly entire, grayish tomentose or pubescent beneath; petiole 5–10 mm. long: fls. fragrant, in slender sometimes leafy stellate-tomentose racemes 5–12 cm. long: corolla with spreading oblong lobes, 2–2.5 cm. across. Fl.v. W.D.129(c). L.D.5:t.310(c). B.B.2:723. Va. to Fla. Intr. 1765. Zone VII.

5. **S. obássia** Sieb. & Zucc. Shrub or small tree, to 10 m., with ascending brs.; young brts. at first floccose-tomentose, soon glabrous: lvs. suborbicular to broad-obovate or elliptic, 7–20 cm. long, abruptly acuminate, usually rounded at base, remotely denticulate above the middle and sometimes tricuspidate at apex, glabrous and deep green above, densely pubescent beneath; petiole 6–20 mm. long: fls. fragrant, in slender glabrous or glabrate racemes 10–20 cm. long; pedicels 8–10 mm. long, pubescent; calyx pubescent 5–9-toothed: corolla about 2 cm. across, with slightly spreading lobes: fr. ovoid, about 2 cm. long. Fl.v–vi. S.Z.1:t.46(c). B.M.7039(c). S.I.1:t.80(c). N.K.13:t.13. A.F.12:30(h). Japan. Intr. 1879. Zone V.—Upright shrub with handsome fls., though partly hidden by the large lvs.

6. **S. Hemsleyàna** Diels. Shrub to 10 m.; brts. stellate-pubescent at first, soon glabrous: lvs. obliquely ovate to obovate, 7–13 cm. long, acuminate, cuneate or rounded at base, remotely serrulate, glabrous above, sparingly stellate-pubescent beneath; petiole 6–15 mm. long; fls. in pubescent racemes 8–15 cm. long, sometimes branched at base; pedicels solitary 3–4 mm. long: corolla 1.5–2 cm. long, with elliptic-oblong lobes imbricate in bud: fr. obovoid 1.5 cm. long. Fl.vi. B.M.8339(c). G.C.III.72:35. Gn.79:205;88:583. C. and W. China. Intr. 1900. Zone VII or VIII.—Very handsome when in bloom.

A related species is **S. Veitchiòrum** Hemsl. Shrub or small tree to 5 m.; lvs. elliptic-lanceolate to lanceolate, 7–11 cm. long, acuminate, cuneate, denticulate, sparingly pubescent or glabrous: racemes 10–20 cm. long, often branched; pedicels 2–3 together on the lower part of raceme: corolla 1.5 cm. long. C. China. Intr. 1900. Zone VII or VIII.

7. **S. dasyântha** Perk. Shrub or small tree to 8 m.; brts. pubescent at first: lvs. elliptic-oblong to obovate, 6–10 cm. long, acuminate, cuneate, minutely toothed above the middle, glabrous above, sparingly pubescent beneath, finally glabrous: fls. in slender racemes 5–10 cm. long, sometimes branched, pedicels 6–8 mm. long, 2–3 together on lower part of raceme; corolla 1–1.5 cm. long, with lanceolate lobes valvate in bud; style longer than corolla. Fl.vii. C. China. Intr. 1900. Zone (V).

8. **S. Shiraiàna** Mak. Small tree; brts. tomentose when young: lvs. alternate, the upper ones subopposite, orbicular-ovate to rhombic-orbicular, 4–8 cm. long, acute, cuneate or rounded at base, coarsely dentate, particularly above the middle, sparingly pubescent on both sides when young, finally nearly glabrous; petiole 8–20 mm. long, the upper ones dilated and sheath-like at base, enclosing the bud: fls. very short-stalked, in 8–10-fld. racemes 6–7 cm. long; calyx campanulate, with often denticulate lobes; corolla-tube 12 mm. long, lobes ovate, 6 mm. long, slightly spreading, imbricate in bud: fr. ellipsoid, 1.5 cm. long. Fl.VI; fr.VIII–IX. E.P.IV.241:71. N.T.1:256. (*Strigila S.* Nakai.) Japan. Intr. 1915. Zone VI?—Very distinct handsome species.

HALÈSIA Ellis. SILVER BELL-TREE. Deciduous trees; winter-buds ovoid, sometimes superposed, with several outer scales: lvs. petioled, serrate: fls. pendulous, in axillary clusters on brts. of the previous season; calyx-tube obconical, with 4 minute teeth, slightly 4-ribbed; corolla broad-campanulate, 4-lobed, open before attaining full size; stamens 8–16; style slender; ovary inferior, 2–4-celled, with 4 ovules in each cell; style filiform: fr. an oblong dry drupe with 2 or 4 longitudinal wings; stone 1–3-seeded; seeds oblong. (After Stephen Hale, author of a famous work on "Vegetable staticks"; 1677–1761.) Syn. *Mohrodendron* Britt. Three or 4 species in E. N. Am. and 1 in E. China.

A. Fr. 4-winged; corolla with shallow lobes (except 1 var.).
B. Corolla 1–1.5 cm. long: fr. 2.5–3.5 cm. long: shrub or small tree.....1. *H. carolina*
BB. Corolla 1.5–2.5 cm. long: fr. 3.5–5 cm. long: tree to 30 m.....2. *H. monticola*
AA. Fr. 2-winged: corolla deeply lobed.....3. *H. diptera*

1. **H. carolìna** L. Large shrub or tree to 10 m.; bark separating into small, closely appressed scales; with spreading brs. and usually of irregular habit: young brts. stellate-pubescent: lvs. ovate or elliptic to ovate-oblong, 5–10 cm. long, acute or acuminate, cuneate or rounded at base, serrulate, tomentose at first, soon glabrous above, pubescent beneath; petiole 6–15 mm. long: fls. 2–5; pedicels 1–2 cm. long, puberulous; corolla 1–1.5 cm. long; stamens 10–16, filaments villous; ovary 4-celled: fr. oblong or obovoid-oblong, 2–3.5 cm. long. Fl.IV–V. B.M.910(c). G.O.t.35(c). S.S.6:t.257. Gn.86: 499(h). G.C.III.51:73,t(h). B.S.1:602,t(h),603. (*H. tetraptera* Ellis, *Mohrodendron carolinum* Britt.) W. Va. to Fla. and E. Tex. Intr. 1756. Zone V.—Var. **dialypétala** Schneid. Corolla divided nearly to the base.—Var. **mollis** Perkins. Lvs. usually broader and short-acuminate, pubescent above and densely villous or tomentose beneath.—Var. **Meehànii** Perkins. Bushy shrub or small tree with upright brs.: lvs. smaller, thicker, rugose, darker green, distinctly serrate, pubescent beneath: fls. short-stalked, smaller, cup-shaped, more deeply divided; ovary slightly superior; filaments glabrous, slightly longer than anthers; style 10 mm. long, with much swollen base: fr. unknown. G.F.5:535. B.C.3:1429. (*H. M.* Meehan.) Orig. before 1890 as seedling of the type; suggests a hybrid.—Very ornamental shrub when covered in early spring with its white fls.; the lvs. turning yellow in autumn.

2. **H. montícola** Sarg. Tree to 30 m., pyramidal when young, later round-topped; bark separating into large loose plate-like scales; brts. soon glabrous: lvs. elliptic to oblong-obovate, acuminate, cuneate to rounded at base, remotely serrate, tomentose at first, soon glabrous except on the veins beneath; petiole 1–2 cm. long: fls. 2–5; pedicels 1–2.5 cm. long, glabrous or pubescent like the calyx; corolla 1.5–2.5 cm. long; stamens 10–16; filaments villous at base: fr. oblong-obovoid, 4–5 cm. long. Fl.V. S.M.827. (*H.*

carolina var. *m.* Rehd.) N. C. to Tenn. and Ga. Intr. about 1897. Zone V.—Var. **vestîta** Sarg. Lvs. often rounded at base, tomentose at first, pubescent beneath, more densely on the veins. N. C., Ark. Intr. 1912.—Var. **rôsea** Sarg. A form of the preceding var. with pale rose fls.—Handsome tree similar to the preceding species, but of more vigorous growth and upright habit.

3. **H. díptera** Ell. Shrub or small tree to 10 m.; young brts. pubescent, becoming glabrous: lvs. elliptic to obovate, 6–12 cm. long, abruptly long-acuminate, cuneate or rounded at base, remotely sinuate-serrulate with minute callous teeth, tomentose at first, becoming glabrous above, pubescent beneath at least on the veins; petiole 1–2 cm. long: fls. 3–6 in clusters or short racemes; pedicels 1.5–3 cm. long, tomentose like the calyx; corolla 2–2.5 cm. long, with very short tube and oval to obovate lobes; stamens usually 8; filaments villous; ovary 2-celled, rarely 4-celled: fr. oblong or oblong-obovate, 3.5–5 cm. long, with 2 broad wings, often with 1 or rarely 2 very narrow wings between them. Fl.v. L.B.1172(c). S.S.6:t.259. E.P.IV. 241:98. M.G.32:281(h),282. S. C. and Tenn. to Fla. and Tex. Intr. 1758. Zone VII or VI.—Similar to the first species, but less hardy and usually not as free-flowering.

H. parviflôra Michx. with smaller fls. and smaller obovoid-clavate narrowly 4-winged (not 2-winged) fr. is probably only a var. of No. 1 and is not hardy within our area.

PTERÓSTYRAX Sieb. & Zucc. Deciduous trees or shrubs; winter-buds with 2 outer scales: lvs. petioled, serrate: fls. in large panicles terminating short lateral brts.; calyx 5-toothed; petals 5, distinct or sometimes slightly cohering at base, imbricate in bud; stamens 10, exserted, connate below into a tube or nearly free; ovary 3-, rarely 4–5-celled, nearly inferior or not more than ⅓ superior; each cell 4-ovuled; style slender, slightly longer than stamens: fr. an oblong dry drupe, ribbed or winged, 1–2-seeded. (Greek *pteron*, wing, and *styrax;* referring to the winged fr. of one species.) Three species in E. Asia.

P. híspida Sieb. & Zucc. Epaulette-tree. Tree to 15 m., with slender spreading brs. forming an open head; brts. sparingly pubescent: lvs. oblong to obovate-oblong, 7–17 cm. long, acute or short-acuminate, rounded or cuneate at base, minutely denticulate, glabrous and bright green above, sparingly pubescent beneath at least on the veins and grayish green; petiole 1–2 cm. long: panicle 12–25 cm. long, pendulous, stellate-pubescent; fls. creamy-white, fragrant, subsessile or short-stalked; petals 8–10 mm. long, narrow-oblong; stamens subequal, nearly free: fr. cylindric, about 1 cm. long, 10-ribbed, densely bristly. Fl.vi. B.M.8329(c). Add. 5:t.290(c). G.C.III. 58:6. G.F.5:389. F.E.14:t.21(h). S.L.318(h). (*Halesia h.* Mast.) China, Japan. Intr. 1875. Zone V.—Very handsome and graceful in bloom with its large pendulous panicles of creamy-white fragrant fls.

A related species is **P. corymbôsa** Sieb. & Zucc. Shrub or tree: lvs. elliptic or ovate, 6–12 cm. long, serrulate with bristly teeth, sparingly stellate-pubescent: panicle corymbose, 8–12 cm. long; stamens unequal, connate below: fr. obovoid, 1–1.5 cm. long, 5-winged, stellate-tomentose. S.Z.1:t.47(c). S.I.2:t.65(c). E.P. IV.241:101. (*Halesia c.* Nichols.) Japan, China. Intr. ?, but apparently not now in cult.

Fam. 96. OLEACEAE Lindl. OLIVE FAMILY

Trees or shrubs: lvs. opposite, rarely alternate, simple or pinnate: fls. perfect or unisexual, regular; calyx 4-lobed or 4-parted rarely 5–16-lobed; corolla gamopetalous, 4-lobed or rarely 6–12-lobed, sometimes of distinct

petals or wanting; stamens 2, rarely 3–5, adnate to corolla and alternate with the lobes; ovary superior, 2-celled, with usually 2 ovules in each cell; style 1 or wanting with simple or 2-lobed stigma: fr. a drupe or berry, caps. or samara; seeds anatropous, with large straight embryo, with or without albumen.—More than 20 genera with over 400 species in temp. and trop. regions.—Many ornamental species; a few are of economic importance and some are valuable timber-trees.

A. Fr. a winged samara.
  B. Lvs. simple, entire: fr. suborbicular, winged all around.
    C. Corolla of 4 distinct small petals.....1. *Fontanesia*
    CC. Corolla gamopetalous, 4-lobed.....2. *Abeliophyllum*
  BB. Lvs. pinnate, rarely simple and serrate: fr. elliptic to linear, winged mainly toward the apex: fls. apetalous or with 2 or 4 narrow petals.....3. *Fraxinus*
AA. Fr. a caps. or drupe.
  B. Fr. a caps.: lvs. simple, rarely 3-foliolate or pinnate, deciduous.
    C. Fls. yellow, with imbricate lobes: brs. hollow or with lamellate pith: lvs. usually serrate.....4. *Forsythia*
    CC. Fls. never yellow, with valvate lobes: brs. with solid pith: lvs. entire or pinnate. 5. *Syringa*
  BB. Fr. a drupe or berry.
    C. Lvs. simple, opposite: fls. white; fr. never 2-lobed.
      D. Corolla-lobes short or corolla wanting.
        E. Fls. axillary; corolla with imbricate lobes or wanting.
          F. Corolla present: lvs. evergreen, entire or serrate.
            G. Stamens exserted: fr. with fragile endocarp.....6. *Phillyrea*
            GG. Stamens included: fr. with bony endocarp: lvs. often spiny-toothed. 7. *Osmanthus*
          FF. Corolla wanting: lvs. deciduous: fls. minute, before the lvs.....8. *Forestiera*
        EE. Fls. in terminal panicles or spikes: corolla-lobes valvate: lvs. entire, deciduous or evergreen.....10. *Ligustrum*
      DD. Corolla-lobes linear, many times longer than tube, valvate: fls. in pendulous panicles: lvs. deciduous.....9. *Chionanthus*
    CC. Lvs. pinnate, opposite or alternate, rarely simple and entire: fls. yellow, rarely white or pink: fr. often 2-lobed.....11. *Jasminum*

1. **FONTANÈSIA** Labill. Deciduous shrubs; winter-buds globose-ovoid, with 2 or 3 pairs of outer scales: brts. quadrangular: lvs. opposite, short-petioled, entire or minutely serrulate: fls. perfect, small, in short axillary racemes and terminal panicles forming leafy panicles on lateral brts.; calyx minute, 4-parted; petals 4, narrow, small; stamens exceeding the petals; ovary superior, 2-celled; stigma 2-lobed: fr. a flat nutlet winged all around; seeds albuminous. (After Réné Louiche Desfontaines, French botanist; 1752–1833.) Two species in W. Asia and China.

F. Fortûnei Carr. Shrub to 5 m., with slender upright brs., glabrous: lvs. lanceolate or ovate-lanceolate, 3–11 cm. long, acuminate, cuneate, entire, lustrous bright green; petiole 1–3 mm. long: fls. greenish white, 3 mm. long, short-pediceled; terminal panicle 3–5 cm. long, the axillary much shorter: fr. oval, 8 mm. long. Fl.v–vi. R.H.1859:43. S.H.2:f.511e-d. (*F. phillyreoides* var. *sinensis* Debeaux, *F. californica* Hort.) China. Intr. 1845. Zone V.—Upright graceful shrub with bright green foliage.

A closely related species is **F. phillyreoides** Labill. Shrub to 3 m., densely branched and more spreading: lvs. ovate-lanceolate or elliptic-oblong, 2–7 cm. long, minutely serrulate or scabrid on the margin, grayish green; petiole 2–5 mm. long; fr. suborbicular to oval, 6–8 mm. long. L.B.1308(c). G.O.t.91(c). D.H.1: 104. (*F. angustifolia* Dipp.) Asia Minor. Intr. 1787. Zone VII?

2. **ABELIOPHÝLLUM** Nakai. Deciduous shrub; winter-buds usually 2, superposed, with 2 or 4 outer scales: pith lamellate: lvs. opposite, simple, entire: fls. perfect, in short racemes from axillary buds on last year's brs.; calyx 4-lobed, with imbricate lobes; corolla with broad spreading imbricate lobes about as long as tube; stamens 2, filaments short; ovary 2-celled; ovules solitary, pendulous; style short: fr. compressed, suborbicular, winged

all around. (Abelia and Greek *phyllon*, leaf; referring to the Abelia-like lvs.) One species in Korea.

A. dístichum Nakai. Shrub to 1 m.; brts. quadrangular, glabrous: lvs. spreading in 2 ranks, ovate to elliptic-ovate, 2–5 cm. long, acuminate, broad-cuneate or rounded at base, appressed-pilose on both sides; petiole 2–5 mm. long: racemes 5–10 mm. long; corolla about 6 mm. across, white: fr. 2–2.5 cm. broad. Fl.v; fr.VIII. N.K.10:t.26. C. Korea. Intr. 1924. Zone V?

3. **FRÁXINUS** L. ASH. Deciduous trees, rarely shrubs: winter-buds often superposed, with 1 or 2 pairs of outer scales, usually brown or black and scurfy: lvs. opposite, pinnate, rarely reduced to 1 lft.: fls. perfect or unisexual, small, in panicles; calyx small, 4-parted or 4-lobed or wanting: corolla of 2–6, usually 4 distinct petals, rarely connate at base, or wanting; stamens usually 2; ovary 2-celled; stigmas 2: fr. a 1-seeded nutlet with an usually elongated wing at the apex; seed oblong, albuminous. (Ancient Latin name of the ash.) About 65 species in the n. hemisphere, in Am. s. to Mex., in Asia s. to Java.—Ornamental trees with handsome foliage, some with conspicuous fls.; several species are important timber-trees.

A. Fls. in terminal panicles on leafy shoots, perfect or polygamous, with or after the lvs. (Sect. ORNUS.)
B. Corolla present.
C. Corolla divided to the base or nearly to the base; stamens with long filaments.
D. Lowest pair of lfts. not or only slightly smaller than others.
E. Lfts. pubescent along the midrib beneath at least near base.
F. Lfts. stalked, usually 7, 5–8 cm. long.....1. *F. Ornus*
FF. Lfts. sessile, 7–9, 12–18 cm. long.....5. *F. Paxiana*
EE. Lfts. quite glabrous, generally 5, 2–4 cm. long.....2. *F. Bungeana*
DD. Lowest pair of lfts. much smaller than others, only occasionally nearly as long.
E. Petiole not conspicuously enlarged at base; lfts. usually more or less stalked.
F. Lfts. quite glabrous beneath, 5–7, 5–8 cm. long.....3. *F. Mariesii*
FF. Lfts. pubescent beneath along the midrib, at least near base.
G. Petiole and rachis grooved above; lfts. pubescent along the midrib and on the lateral veins.....4. *F. pubinervis*
GG. Petiole and rachis not or slightly grooved: lfts. pubescent only along midrib or nearly glabrous.....7. *F. longicuspis*
EE. Petioles conspicuously enlarged at base: lfts. sessile.....6. *F. Spaethiana*
CC. Corolla connate into a tube exceeding the sepals; anthers subsessile: lfts. 3–6 cm. long lanceolate.....8. *F. cuspidata*
BB. Corolla wanting: lfts. 5–7, stalked, pubescent along the midrib beneath..9. *F. chinensis*
AA. Fls. from leafless axillary buds, before the lvs.; corolla wanting or with 2 petals in *F. dipetala* (see under No. 10). (Sect. FRAXINASTER.)
B. Fls. with a calyx persistent on the fr.; anthers linear or linear-oblong: lfts. usually 5–7: buds brown.
C. Lvs. with winged rachis; lfts. 5–9, 1–4 cm. long: fls. perfect. (Subsect. SCIADANTHUS.)
10. *F. xanthoxyloides*
CC. Lf.-rachis not winged; lfts. 5–15 cm. long: fls. dioecious. (Subsect. BUMELIOIDES.)
D. Fr. lanceolate or oblanceolate, its body terete or nearly so: lvs. pinnate: brts. terete.
E. Wing of fr. terminal, not or slightly decurrent: lfts. slender-stalked, papillose beneath.
F. Lvs. and brts. glabrous.....11. *F. americana*
FF. Lvs. and brts. pubescent.....12. *F. biltmoreana*
EE. Wing of fr. decurrent to or below the middle, hence body margined (scarcely to the middle in No. 15).
F. Fr. 2–7 cm. long; wing much longer than body: lfts. 5–9.
G. Lfts. stalked, 7–9, usually 9.
H. Fr. 5–7 cm. long; brts. and lvs. pubescent.....13. *F. profunda*
HH. Fr. 2.5–6 cm. long; brts. and lvs. pubescent or glabrous.
14. *E. pennsylvanica*
GG. Lfts. sessile or nearly sessile.
H. Petioles not dilated at base: lfts. 5–7, rarely 9; brts. and lvs. pilose.
16. *F. oregona*
HH. Petioles dilated at the tomentose base; lfts. 7–11: brts. glabrous.
17. *F. platypoda*
FF. Fr. 1–2 cm. long; wing as long or shorter than body: lfts. 3–7, short-stalked or nearly sessile; lvs. and brts. pubescent or glabrous.....15. *F. velutina*
DD. Fr. obovate or elliptic to oblong-elliptic, compressed, winged to the base.
E. Brts. terete: lfts. 5–7.....18. *F. caroliniana*

EE. Brts. quadrangular.
F. Lfts. usually 5, ovate, acute ..... 19. *F. Lowellii*
FF. Lfts. reduced to 1, ovate to suborbicular ..... 20. *F. anomala*
BB. Fls. without calyx (or a deciduous minute calyx in No. 20); anthers cordate, rarely broad-oblong: lfts. usually 7 or more. (Subsect. MELIOIDES.)
C. Brts. 4-angled and usually winged: lfts. 7–11: fls. perfect with minute deciduous calyx. 21. *F. quadrangulata*
CC. Brts. terete or nearly so: fls. without calyx.
D. Rachis at base of lfts. with thick rufous tomentum: fls. dioecious.
E. Lfts. sessile, nearly rounded at base ..... 22. *F. nigra*
EE. Lfts. narrowed into a very short stalk ..... 23. *F. mandshurica*
DD. Lfts. without conspicuous tomentum at base of lfts.: fls. perfect or polygamous, rarely dioecious.
E. Lfts. sessile or subsessile.
F. Lfts. glabrous or pubescent only along the midrib beneath: ovary glabrous.
G. Lfts. 7–13.
H. Winter-buds black or nearly black: lfts. appressed-serrate or serrate, usually villous along the midrib beneath ..... 24. *F. excelsior*
HH. Winter-buds brown: lfts. sinuate-dentate or serrate, usually remotely so.
I. Lfts. elliptic to broad-elliptic or obovate, obtuse to acute, 9–13. 25. *F. rotundifolia*:
II. Lfts. lanceolate or narrow-oblong.
J. Lfts. 9–13, rarely 7, glabrous beneath: fr. rounded at base. 26. *F. angustifolia*
JJ. Lfts. 7–9, rarely 5, pubescent along the midrib beneath: fr. narrowed at base ..... 27. *F. oxycarpa*
GG. Lfts. 3–5, rarely 7, lanceolate, glabrous ..... 28. *F. syriaca*
FF. Lfts. pubescent on both sides or at maturity only beneath ..... 29. *F. holotricha*
EE. Lfts. distinctly stalked: brts. and lvs. glabrous ..... 30. *F. potamophila*

Sect. ORNUS DC. Fls. in terminal and lateral panicles on leafy brs., with or after the lvs., perfect or polygamous.

Subsect. EUORNUS Koehne & Lingelsh. Corolla present.

1. **F. Ornus** L. FLOWERING A. Round-headed tree to 20 m.; winter-buds grayish or brownish: lfts. usually 7, stalked, oblong to ovate, the terminal one obovate, 3–7 cm. long, abruptly pointed, usually broad-cuneate, irregularly serrate, glabrous except pubescent along the base of the midrib beneath: fls. white, fragrant, in dense terminal panicles 7–12 cm. long; petals linear, 6 mm. long: fr. narrow-oblong, 2–2.5 cm. long, truncate or emarginate at apex. Fl.v–vi. R.I.17:t.31,f.1–2(c). H.W.3:120(h),t.60(c). Gn.48:286;79:362(h). F.E.22:61(h). B.S.1:572,t(h). (*Ornus europaea* Pers., *F. floribunda* Hort., not Wall.) S. Eu., W. Asia. Intr. before 1700. Zone V.—Var. **jugландifôlia** Ten. Lfts. ovate-oblong, 5–10 cm. long and 2.5–5 cm. broad. D.H.1:70(l). (Var. *latifolia* Dipp.)—Var. **rotundifôlia** Ten. Lfts. broad-elliptic to orbicular-obovate. S.H.2:513c(l). (*F. r.* Lam., not Mill.)—Handsome round-headed tree very attractive when in bloom.

2. **F. Bungeàna** DC. Small tree to 5 m. or shrub; winter-buds nearly black: brts. puberulous: lfts. usually 5, rarely 7, stalked, ovate or orbicular-ovate, 2–4 cm. long, obtusish to short-acuminate, broad-cuneate, serrate, glabrous: panicles 5–7 cm. long, puberulous; filaments longer than the linear petals: fr. narrow-oblong, 2.5–3 cm. long, obtuse or emarginate. Fl.v. G.F. 7:5. B.C.3:1274. (*F. B.* var. *parvifolia* Wenz., *F. Dippeliana* Lingelsh., *F. parvifolia* Lingelsh.) N. China. Intr. 1881. Zone V.—Distinct species handsome in bloom.

A related species is **F. raibocárpa** Reg. Small tree: lfts. 3–5, elliptic to obovate or oblong-obovate, 2–6 cm. long, obtuse or acute; petiole wing-margined: fr. curved, 2.5 cm. long, with rhombic wing. E.P.IV.243,1:20. D.H.1:93. Turkest. Cult. 1884. Zone V?

3. **F. Mariêsii** Hook. f. Shrub or small tree to 8 m.; winter-buds grayish; young brts. puberulous: lfts. 3–5, rarely 7, usually closely set, subsessile, elliptic to ovate-lanceolate, 3–8 cm. long, acute or acuminate, crenate-serrulate or nearly entire, pale beneath, subcoriaceous; petiole and petiolules purple near base; panicle 8–14 cm. long; calyx minute; petals sometimes 5–6:

fr. 1.5–3 cm. long, oblanceolate. Fl.vi. B.M.6678(c). B.S.1:570. I.T.4:t. 158. C. China. Intr. 1878. Zone VII?—Handsome shrub of slow growth, free-flowering; fr. attractive in summer by their purple color.

A related species is **F. retùsa** Champ. Lfts. 3–7, slender-stalked, ovate to oblong, 5–15 cm. long, acuminate, dentate or entire, quite glabrous, subcoriaceous and reticulate beneath: calyx large. E. China. Not in cult.—Var. **Henryàna** Oliv. Tree to 12 m.: lfts. on stalks 4–15 mm. long, oblong to lanceolate, serrulate; panicle dense, 10–15 cm. long: fr. 2–2.5 cm. long, emarginate. H.I.1930. C. China. Intr. 1900. Zone VII?—Another species with glabrous subcoriaceous lfts. is **F. Griffithii** C. B. Clarke. Tree to 15 m. Lfts. 5–11, ovate to elliptic-oblong, 5–14 cm. long, acuminate, entire: fls. in large loose bracted puberulous panicles. (*F. bracteata* Hemsl.) China to Philipp. and Mal. Intr. 1900 from China. Zone VIII? Very handsome.

4. **F. pubinérvis** Bl. Tree; lfts. 5–11, stalked, elliptic to ovate-oblong, 5–10 cm. long, acuminate, broad-cuneate, crenate-serrate, dark green and glabrous or nearly so above, hairy along the midrib and on the primary veins beneath: fr. oblanceolate, 3–3.5 cm. long. N.T.1:295. (*F. Bungeana* var. *p.* Wenzig.) Japan. Intr. before 1900. Zone V.

A related species is **F. floribúnda** Wall. Tree to 40 m.; brts. glabrous: lfts. 7–9, short-stalked, ovate-oblong to oblong, 10–15 cm. long, long-acuminate, sharply serrate, with prominent pubescent veins beneath; rachis slightly winged: panicles 20–30 cm. long: fr. linear-spatulate, 3 cm. long, obtuse or emarginate. E.P.IV.243,1:21. Himal. Intr. 1822 and 1876. Zone VIII?

5. **F. Paxiàna** Lingelsh. Tree to 20 m.; winter-buds rusty-tomentose: lfts. 7–9, sessile, ovate to oblong-lanceolate, 8–18 cm. long, acuminate, rounded or broad-cuneate at base, crenulate, glabrous: panicle large; calyx large; petals linear-spatulate as long as stamens: fr. linear-spatulate, 2.5–3 cm. long. Fl.vi. B.M.9024(c). S.H.2:f.515d(l). China, Himal. Intr. about 1904. Zone V.—Handsome tree with large lvs.

6. **F. Spaethiàna** Lingelsh. Tree: lfts. 5–9, sessile, oblong to oblong-obovate, 8–16 cm. long, the lowest pair much smaller, short-acuminate, irregularly and rather coarsely crenate-serrate, dark green above, lighter beneath and glabrous except along the midrib near base; petiole grooved, much enlarged near base and reddish brown: fr. oblanceolate, 3–3.5 cm. long, obtuse. S.H.2:f.516g(l). N.T. 1:296. (*F. stenocarpa* Koidz.) Japan. Cult. 1873. Zone V.—Handsome tree with large lvs.

7. **F. longicúspis** Sieb. & Zucc. Small tree to 15 m.; winter-buds rufous-pubescent; brts. glabrous, slightly quadrangular, slender: lfts. usually 5, rarely 7, stalked, elliptic to ovate-lanceolate, 5–10 cm. long, long-acuminate, cuneate, serrate or crenate-serrate, glabrous or nearly glabrous; petiole grooved above: fls. in panicles 6–12 cm. long; calyx minute; petals linear-oblong, as long as stamens: fr. linear-oblong or oblanceolate, 2–3.5 cm. long, obtuse. Fl.vi. S.I.1:t.81(c). N.T.1:290. Japan. Intr. about 1870. Zone V.—Var. **Sieboldiàna** Lingelsh. Lfts. acuminate, sometimes short-acuminate, 3.5–8 cm. long, the lowest pair sometimes ovate, crenate-serrulate, sometimes nearly entire, pubescent along the midrib beneath. Japan, Korea. N.T.1:292. N.K.10:t.7. (*F. S.* Bl.)—Var. **sambucìna** Lingelsh. Lfts. sessile, more sharply serrate. (*F. Sieboldiana* var. *s.* Bl.) Japan.—Graceful Ash with white fls. in June and handsome foliage turning purple in autumn.

8. **F. cuspidàta** Torr. Shrub or rarely small tree, with slender brs.; winter-buds dark reddish brown, glutinous: lfts. usually 7, slender-stalked, lanceolate or oblong-lanceolate, 3–6 cm. long, acuminate, cuneate, coarsely serrate, glabrous with obscure veins; petiole slender, sometimes wing-margined: fls. fragrant, in panicles 6–10 cm. long; corolla about 1.5 cm. long, divided to below the middle into linear-oblong lobes; anthers subsessile, not exceeding

the tube: fr. spatulate-oblong, 2–2.5 cm. long. Fl.IV–V. S.S.6:t.260. E.P. IV.243,1:27. (*Ornus c.* Nieuwl.) Ariz. and N. Mex. to Tex. and Mex. Intr. 1914. Zone VII or VIII.—Var. **macropétala** Rehd. Lfts. usually 3–5, often ovate and usually entire. (*F. m.* Eastw.) N. Ariz. Intr.?

Subsect. 2. Ornaster Koehne & Lingelsh. Corolla wanting.

9. **F. chinénsis** Roxb. Tree to 15 m.; winter-buds brownish black: lfts. 5–9, short-stalked to subsessile, elliptic to elliptic-ovate, 3–10 cm. long, acuminate, crenate-serrate, pubescent along the midrib beneath and on the primary veins; petiole enlarged at base: panicle large and loose, 8–15 cm. long; calyx campanulate, irregularly lobed; anthers ovoid to oblong-ovoid, about as long as filaments: fr. oblanceolate, 3–4.5 cm. long and 4–6 mm. broad. Fl.v. C.C.280. E.P.IV.243,1:29. China. Intr. 1891. Zone V.—Var. **acuminàta** Lingelsh. Lfts. usually 3–5, stalked, ovate-lanceolate to lanceolate, to 12 cm. long, long-acuminate, more sharply serrate. E.P.IV.243,1:f. 8d(1). (*F. Koehneana* Lingelsh., *F. Szaboana* Lingelsh.) China. Intr. 1910. —Var. **rhynchophýlla** Hemsl. Lfts. usually 5, broad-ovate or obovate, rarely oblong-obovate, 6–15 cm. long, acuminate, rarely obtusish, coarsely crenate-serrate, rarely subentire, usually pubescent on the veins beneath, rarely glabrous; rachis usually rufous-pubescent at the nodes: panicle shorter. G.F. 6:485. S.H.2:f.516c,518a-e. N.K.10:t.4. (*F. r.* Hance, *F. obovata* Schneid., not Bl., *F. Bungeana* Hance, not DC.) Manch., Korea, Japan, China. Intr. 1892.—Handsome tree with large lvs.; one of the trees on which the wax insect lives.

Sect. II. FRAXINASTER DC. Panicles from leafless lateral buds; fls. usually apetalous, appearing before the lvs.

Subsect. 1. Sciadanthus Coss. & Dur. Fls. with calyx, polygamous, in dense panicles; lvs. with winged rachis; lfts. 3–13, small, not exceeding 4 cm., obtuse.

10. **F. xanthoxyloìdes** Wall. Shrub or small tree, with spreading brs.; young brts. minutely puberulous: lfts. usually 5–9, subsessile, oval to oblong or oblong-ovate, 0.5–4 cm. long, obtuse to acute, crenate-serrate, slightly pubescent on the veins beneath: panicle short, fascicle-like; calyx minute; anthers large, subsessile: fr. linear-oblong to spatulate, 3.5–5 cm. long; wing decurrent to base. D.H.1:71. S.H.2:f.516h-i,518g-k. W. Himal., Afghan. Intr. before 1870. Zone VII?—Var. **dimórpha** Wenzig. Brts. glabrous: lfts. usually glabrous beneath and shorter and broader. E.P.IV.243,1:f.34e(fr.). D.H.1:71. M.A.t.18b(c). N. Afr. Intr. before 1865.—Var. **dumòsa** Lingelsh. Shrubby form of the preceding var., of dense habit: lfts. 5–10 or 15 mm. long, suborbicular to oval.

One of the species with axillary fls. and with petals is **F. dipétala** Hook. & Arn. (Subsect. Dipetalae.) Shrub or small tree; brts. quadrangular: lfts. usually 5, stalked, broad-elliptic to ovate, 1.5–4 cm. long, usually obtuse, serrate, glabrous: fls. with the lvs., in panicles 5–10 cm. long; petals 2, oval, 4–5 mm. long: fr. oblanceolate, 2.5 cm. long. S.S.6:t.261. (*Petlomelia d.* Nieuwl.) Calif. Intr. 1878. Zone VIII?

Subsect. Melioides Endl. Fls. with calyx, usually dioecious: lfts. large; rachis not winged. (Sect. *Leptalix* Koehne, sect. *Ornus* subs. *L.* Wesmael, *Calycomelia* Kostel.)

11. **F. americàna** L. White A. Tall tree to 40 m.; young brts. dark green or brownish, glabrous and lustrous: lfts. 5–9, usually 7, stalked, ovate to ovate-lanceolate, 6–15 cm. long, acuminate, cuneate or rounded at base, usually entire, or slightly dentate toward the apex, dark green above, glaucous beneath and usually glabrous; petiolules 5–15 mm. long; anthers oblong,

apiculate: fr. 3–5 cm. long, with terete body, the wing narrow-oblong to spatulate, not decurrent, emarginate or obtuse. S.S.6:t.268,269. E.H.4:t. 246(h). G.F.7:405(h). F.E.23:427(h). (*F. acuminata* Lam., *F. Novae-Angliae* Mill., *F. alba* Marsh.) N. S. to Minn., s. to Fla. and Tex. Intr. 1724. Zone (II).—Var. **ascidiàta** Shull. Lfts. pitcher-shaped at base. G.C. III.76:335. Intr. about 1910.—Var. **iodocárpa** Fern. Fr. red-purple, conspicuous in summer.—Var. **subcoriàcea** Sarg. Lfts. oblong-ovate, thicker, 7.5–13 cm. long, entire or slightly serrate, silvery white beneath. (Var. *crassifolia* Sarg.) Intr. 1874.—Var. **juglandifòlia** Rehd. Lfts. more or less serrate or crenate-serrate, less lustrous above, more or less pubescent beneath and less glaucous. (*F. j.* Willd.) More common north. Cult. 1800.—Handsome vigorous tree with the lvs. turning deep purple or yellow in autumn.

A related species is **F. texénsis** Sarg. Tree to 15 m.; lfts. usually 5, elliptic to nearly obovate, 3–8 cm. long or larger on young trees, acute or obtuse, crenulate-serrate chiefly above the middle, reticulate beneath: fr. 1.5–3 cm. long. S.S.6:t.270. Tex. Intr. 1901. Zone V.

12. **F. biltmoreàna** Beadle. Tree to 15 m.; brts. and petioles densely short-pubescent: lfts. 7–11, stalked, ovate-oblong to lanceolate and often falcate, 8–15 cm. long, acuminate, broad-cuneate or rounded at base, entire or obscurely toothed, dark green and glabrous above, glaucous and pubescent beneath, more densely on the veins: panicles pubescent; anthers oblong, acute: fr. 3–4 cm. long; body terete; wing not decurrent, linear-oblong, emarginate. S.S.14:t.716. E.H.4:t.247(h). N. J. to Ga., Ala. and Mo. Cult. about 1800. Zone V.—Handsome Ash similar to the preceding species.

13. **F. profúnda** Bush. Pumpkin A. Tree to 40 m.; brts. and petioles tomentose: lfts. usually 7, stalked, elliptic or lanceolate, 10–25 cm. long, acuminate, broad-cuneate or rounded at base, entire or slightly serrate, nearly glabrous above at maturity, soft-pubescent beneath; petiolules 5–10 mm. long; anthers oblong, apiculate, on slender filaments: fr. 5–7 cm. long; wing oblong, rounded or emarginate, decurrent to below the middle or nearly to the base of the thick terete body. S.S.14:t.714–5. W. N. Y. to Ill., La. and n. w. Fla. Intr. 1913. Zone V.—Handsome large-leaved Ash.

14. **F. pennsylvànica** Marsh. Red A. Tree to 20 m.; brts. and petioles densely pubescent: lfts. 5–9, stalked, ovate to oblong-lanceolate, 8–14 cm. long, acuminate, broad-cuneate, crenate-serrate or entire, pubescent beneath; petiolules 3–6 mm. long: panicle rather compact, tomentose; anthers linear-oblong, on short filaments: fr. 3–6 cm. long; wing lanceolate to oblong-obovate, rounded to acuminate, rarely emarginate, decurrent to below the middle or nearly to base. S.S.6:t.271. (*F. pubescens* Lam.) N. S. to Man., s. to Ga., Ala. and Miss. Intr. 1783. Zone II.—A variable species gradually passing into the var. lanceolata.—Var. **aucubaefòlia** Rehd. Lfts. mottled with yellow.—Var. **lanceolàta** Sarg. Green A. Brts. and petioles glabrous; lfts. elliptic-oblong to lanceolate, 5–12 cm. long, irregularly serrate, bright green above, glabrous on both sides or pubescent along the midrib beneath; panicles glabrous. S.S.6:t.272. (*F. l.* Borkh., *F. viridis* Michx.) Me. to Fla., w. to Sask., Mont. and Tex. Intr. 1824. Zone (I).

A related species is **F. Berlandieriàna** DC. Tree to 10 m., rarely more: lfts. 3–5, slender-stalked, lanceolate or elliptic to obovate, 7–10 cm. long, acuminate, broad-cuneate, remotely serrate or nearly entire, hairy in the axils of the veins beneath or glabrous: fr. oblong-obovate to spatulate, 2.5–3.5 cm. long; wing decurrent to near the base. S.S.6:t.273. Tex. to n.e. Mex. Intr. 1879. Zone VII or VIII.

15. **F. velutìna** Torr. Tree to 15 m.; brts. velvety-pubescent: lfts. 3–5, short-stalked or subsessile, elliptic to ovate, 2–4 cm. long, acute, rarely obtus-

ish, broad-cuneate, crenate-serrulate above the middle, pubescent beneath and somewhat reticulate: panicles pubescent; anthers oblong, apiculate: fr. 1–1.8 cm. long, wing oblong-obovate to elliptic, shorter than the terete body and decurrent scarcely to the middle. S.M.848. Ariz. and N. Mex. Intr.? Zone VIII?—Var. **coriàcea** Rehd. Lfts. more coriaceous and more reticulate, less pubescent or glabrescent. Rep. N. S. Geog. Surv. West 100th Mer. 6:t.22. (*F. c.* S. Wats.) Utah, Calif. Cult. 1900. Zone VII?—Var. **glabra** Rehd. Lfts. 3–7, glabrous like the brts. Intr. 1916. Ariz. Zone VIII?—Var. **Toumeŷi** Rehd. Young brts. pubescent or glabrescent: lfts. 5–7, elliptic to lanceolate, 3–7 cm. long, acuminate, cuneate, serrulate above the middle, finely pubescent beneath; petiolules 3–10 mm. long: fr. 1.5–2.5 cm. long; wing spatulate or oblong, about as long or rarely slightly longer than the terete body. S.S.6:t.267. S.M.849. B.T.803. M.G.28:556(h). (*F. T.* Britt.) Ariz., N. Mex. and Mex. Intr. 1891. Zone VI?—Recommended as a street tree for a dry climate, particularly the var. *Toumeyi*.

16. **F. orégona** Nutt. Tree to 25 m.; brts. usually pilose: lfts. 5–9, usually 7, sessile, rarely stalked, elliptic or obovate to oblong, 8–16 cm. long, acute, broad-cuneate, entire or remotely and slightly serrate, pubescent above at first, becoming glabrous, pubescent beneath, light green: panicles glabrous; anthers oblong, on short filaments: fr. 3–5 cm. long; wing elliptic-oblong to oblanceolate, decurrent nearly to the base of the slightly compressed body. S.S.6:t.276. (*F. californica* Hort.) Wash. to s. Calif. Cult. 1870. Zone VI?

17. **F. platýpoda** Oliv. Tree to 22 m.: petiole enlarged and tomentose at base: lfts. 7–11, sessile, elliptic-oblong or ovate-lanceolate, 5–10 cm. long, short-acuminate, serrulate, gray-green and quite glabrous above, pale and papillose and pilose on the veins beneath: panicle 12–15 cm. long; fr. oblong, 4–5 cm. long, narrowed at ends, compressed, winged to the base. H.I.1229. C.C.282. China. Intr. 1909. Zone V.

18. **F. caroliniàna** Mill. Water A. Tree to 15 m.; winter-buds chestnut-brown; brts. glabrous or pubescent: lfts. 5–7, stalked, elliptic or ovate to oblong, 5–12 cm. long, acuminate, broad-cuneate or sometimes rounded at base, serrate, rarely entire, glabrous or sparingly pilose on the veins, rarely pubescent (var. *Rehderiana* Sarg.) beneath: anthers linear, apiculate, on slender filaments: fr. elliptic to oblong-obovate, 3–5 cm. long, acute to emarginate; body compressed and surrounded by the wing, sometimes 3-winged. S.S.6:t.274, 275. (*F. platycarpa* Michx.) Va. to Fla., w. to Ark. and Tex. usually in swamps. Intr. 1824. Zone VII or VIII.

19. **F. Lowéllii** Sarg. Tree to 8 m.: brts. quadrangular and winged: lfts. 5, rarely 3 or 7, short-stalked, ovate or elliptic-ovate, 5–8 cm. long, acute or acuminate, broad-cuneate, remotely and slightly toothed, yellow-green, glabrous or slightly pubescent: fr. oblong-obovate or elliptic-oblong, 2.5–3.5 cm. long, usually rounded at apex; body compressed, winged to the base. S.M.836. Ariz. Intr. 1914. Zone VII or VIII.

20. **F. anómala** S. Wats. Single-leaf A. Shrub or tree to 7 m.; brts. quadrangular, slightly winged, glabrous: lvs. simple or occasionally with 2–3 lfts., broad-ovate or suborbicular, 3–6 cm. long, rounded or acutish at apex, entire or sparingly crenate-serrate, glabrous and dark green above, paler beneath and pubescent when young; petiole 1–3 cm. long, rusty-pubescent when young: fls. in short panicles, with the lvs., perfect or unisexual; anthers linear-oblong, on slender filaments: fr. obovate-oblong, 2 cm. long, rounded or emarginate. S.S.6:t.266. E.P.IV.243,1:39 Colo. to Utah, S. Calif. Cult. 1890. Zone VI.—A very distinct and interesting Ash.

Subsect. 3. Bumelioides Endl. Fls. without calyx and corolla; only in No. 21 a minute deciduous calyx: fls. dioecious or polygamous; anthers broad-oblong to cordate: lfts. usually more than 7.

21. **F. quadrangulàta** Michx. Blue A. Tree to 25, rarely to 40 m.; brts. 4-angled and usually slightly winged, glabrous: lfts. 7–11, short-stalked, ovate to lanceolate, 6–12 cm. long, acuminate, broad-cuneate or rounded at base, sharply serrate, yellow-green, glabrous except along midrib near base beneath: fls. perfect, in short panicles: anthers short-oblong, obtuse, nearly sessile: fr. oblong, 3–5 cm. long, emarginate, winged to the base. S.S.6:t.263. Mich. to Ark. and Tenn. Intr. 1823. Zone V.—A handsome vigorously growing tree; the lvs. turning pale yellow in autumn; a valuable timber tree.

22. **F. nígra** Marsh. Black A. Tree to 25 m.; winter-buds dark brown; brts. terete, glabrous: lfts. 7–11, sessile, oblong to oblong-lanceolate, 7–12 cm. long, long-acuminate, obliquely cuneate or rounded at base, serrate with small incurved teeth, dark green above, lighter green beneath, glabrous except the rusty tomentum at base and along the midrib beneath: fls. dioecious; anthers oblong, apiculate, on short filaments: fr. narrow-oblong to oblong-obovate, 2.5–3.5 cm. long, rounded or emarginate; body flat; wing decurrent to base. S.S.6:t.264–5. Em.382. Am. For.21:728(h). (*F. sambucifolia* Lam.) Nfdl. to Lake Winnipeg, s. to W. Va., Iowa and Ark.; in moist places. Intr. 1800. Zone II.

23. **F. mandshùrica** Rupr. Manchurian A. Tree to 30 m.; brts. obtusely quadrangular, glabrous; winter-buds dark brown: lfts. 9–11, sessile, oblong-ovate to oblong-lanceolate, 7–12 cm. long, long-acuminate, cuneate, sharply serrate, dull green above and often sparingly hispid, usually pilose or hispid on the veins beneath, rufous-tomentose at base; rachis slightly winged: fls. dioecious: fr. oblong-lanceolate, 2.5–3.5 cm. long. S.I.2:t.62 (as *F. Sieboldiana*). N.K.10:t.8. N.T.1:299. N. E. Asia. Intr. 1882. Zone IV.—Like the preceding species usually not satisfactory under cult.

24. **F. excélsior** L. European A. Tree to 30 or 40 m.; winter-buds black or nearly so: brts. glabrous: lfts. 7–11, sessile, ovate-oblong to ovate-lanceolate, 5–11 cm. long, acuminate, cuneate, serrate, dark green above, lighter green beneath, glabrous except villous along the midrib beneath: fls. polygamous; anthers ovoid, apiculate, shorter than filaments: fr. lanceolate to narrow-oblong, 2.5–4 cm. long, obtuse or emarginate to acute. H.W.3: 115(h),116,t.59(c). R.I.17:t.31,f.3–6(c). S.E.6:t.902(c). F.E.24:395(h). E. H.4:t.239–244(h). Eu., Asia Minor. Cult. since centuries. Zone V or IV.—Var. **argénteo-variegàta** West. Lfts. variegated or margined white. (Var. *albo-variegata* Hayne, f. *argentea* Lingelsh.)—Var. **aùreo-variegàta** West. Lvs. variegated or margined yellow. (Var. *lutea* Loud.)—Var. **aùrea** Willd. With yellow brts. (Var. *lutea* West.?)—Var. **diversifòlia** Ait. Lvs. simple or sometimes 3-parted and usually incised-dentate. S.E.6:t.903(c). Gn.22:273. S.H. 2:f.523h-l. M.D.1915:294,t(h). (*F. simplicifolia* Willd., *F. monophylla* Desf., *F. heterophylla* Vahl, *F. e. simplicifolia laciniata* Kirchn.)—Var. **eròsa** Loud. Lfts. very narrow, incisely serrate or erose dentate.—Var. **aspleniifòlia** Kirchn. Lfts. linear, slightly serrulate. S.H.f.523g(l).—Var. **crìspa** Willd. With small very dark green, curled and twisted lfts.; of slow growth. S.H.2: f.523f(l). (Var. *atrovirens* Hort., var. *cucullata* Hort.)—Var. **nàna** Hayne. A dwarf compact slow-growing form with very small lfts. S.H.2:f.523k(l). M.G.19:380(h). (*F. nana* Willd., *F. polemoniifolia* Poir., *F. e. globosa* Hort.). —Var. **péndula** Ait. With pendulous brs. Gn.68:400(h). E.H.4:t.238(h). L.A.6:t.158(h). (Var. *Wentworthii* Hort.)—Var. **"aurea péndula"** Loud.

With yellow pendulous brs.—Var. **horizontàlis** Poir. With horizontally spreading limbs and pendulous brs. forming a broad flat head. Gn.39:451(h). G.W.20:53(h).

A related species is **F. Hoòkeri** Wenzig. Tree; buds nearly black, with conspicuous margin of pale fulvous tomentum: lfts. 5, elliptic to oblong, 6–12 cm. long, acuminate, denticulate or nearly entire, usually villous along the midrib beneath: fls. dioecious: fr. lanceolate, 4–4.5 cm. long, sulcate in the middle. N. W. Himal. Intr. 1920. Zone V?

25. **F. rotundifòlia** Mill. Shrub or small tree to 5 m., with slender often purplish brs.: lfts. 7–13, sessile, orbicular-ovate to elliptic or obovate, rarely elliptic-oblong, 1–3 cm. long, acute or rounded at apex, serrate, glabrous or pubescent along the midrib beneath near base: fr. oblong, about 3 cm. long. S.H.2:f.524h-i(l). D.H.1:95(l). (*F. parvifolia* Lam., *F. p.* var. *minor* Dipp., *F. oxycarpa* var. *parvifolia* Wenz.) S. Eu., W. Asia. Cult. 1750. Zone VI.—Var. **péndula** Rehd. Brs. pendulous. (*F. parvifolia* var. *p.* Dipp., *F. lentiscifolia p.* Loud.)

A related species is **F. numídica** Dipp. Lfts. 7–9, elliptic, 2–3 cm. long, acute, cuneate, serrate, sparingly hairy above and on the veins beneath; rachis and petiole narrowly winged, sparingly short-pilose. D.H.1:96(l). Mediterr. Reg. Cult. 1890.

26. **F. angustifòlia** Vahl. Tree to 25 m.; winter-buds dark brown; brts. glabrous: lfts. 7–13, sessile, oblong-lanceolate to narrow-lanceolate, 3–7 cm. long, acuminate, cuneate, sharply and remotely serrate, dark green above, lighter beneath, glabrous; rachis with closed groove open only at nodes: panicles short, few-fld.; anthers ovoid, cordate, about as long as filaments: fr. elliptic-oblong to oblanceolate, 3–4 cm. long, acute or obtuse, rounded at base. D.H.1:91. E.H.4:t.245(h),262,f.6(l). (*F. oxycarpa* var. *a.* Lingelsh., *F. tamariscifolia* Vahl.) S. Eu., N. Afr., W. Asia. Cult. 1800. Zone VI?—Var. **lentiscifòlia** Henry. Lfts. more spreading and more remote, lf. sometimes to 25 cm. long. (*F. l.* Bosc.)—Var. **monophýlla** Henry. Lvs. simple or with 2–3 lfts., lanceolate, 5–12 cm. long, glabrous. (*F. Veltheimii* Dieck.) E.H.4:t.262,f.3(l). Cult. 1885.—Var. **austràlis** Schneid. Lfts. beneath near midrib and rachis hairy. (*F. a.* Gay, ?*F. tamariscifolia* Dipp., not Vahl.) S. Eu., N. Afr. Cult. 1890. Zone VI or VII.

Related species are: **F. elonza** Kirchn. Small tree; brts. gray-green with whitish warts: lfts. 9–13, elliptic-ovate to ovate-lanceolate, 2.5–6 cm. long, acute, broad-cuneate, villous beneath along the midrib: fr. narrow-oblong. D.H.1:87. Origin unknown; cult. 1864. Zone V.—**F. obliqua** Tausch. Small tree: lfts. 9–11, subsessile, elliptic-ovate to ovate-lanceolate, 4–8 cm. long, the terminal to 12 cm. long, acuminate, broad-cuneate, glabrous; rachis with continued open groove: fr. oblong-obovate, 2.5–3 cm. long, acute. S.H.2:f.424c(l). (*F. Willdenowiana* Koehne, *F. rotundifolia* Hort., not Mill.) W. Asia. Cult. 1834.

27. **F. oxycárpa** Willd. Tree; winter-buds dark brown: lfts. 7–9, rarely 5 or 11, sessile, ovate-oblong, ovate-oblong to lanceolate, 4–7 cm. long, acuminate, cuneate or broad-cuneate, sharply serrate, light green on both sides and glabrous except villous along the midrib beneath: fr. obovate-oblong to lanceolate, 3–4 cm. long, acute or obtusish, narrowed at base of the compressed body. S.H.2:f.522f-g,525n-p. D.H.1:89. (*F. oxyphylla* Bieb.) S. Eu. to Persia and Turkest. Intr. 1815. Zone V.

28. **F. syríaca** Boiss. Syrian A. Small tree, brs. often with shortened internodes and crowded whorled lvs.: lfts. 3–5, rarely 7, lanceolate, 3–10 cm. long, acuminate, cuneate, sharply serrate, bright green, quite glabrous, stomatiferous on both sides: fls. in short panicles: fr. obovate-oblong, 3–4 cm. long, obtuse or acute. D.H.1:92. S.H.2:f.524e,525a-d. (*F. sogdiana* Dipp., not Bge., *F. turkestanica* Carr.) W. and C. Asia. Cult. 1880. Zone V.

29. **F. holótricha** Koehne. Small tree; brts. and petioles pubescent: lfts. 9–13, short-stalked or subsessile, ovate or oblong-lanceolate, 3–8 cm. long, acuminate, sharply serrate, pubescent on both sides when young: ovary pubescent; anthers oval, subsessile. M.D.1910:114; 1925:281,f.1,4. S.H. 2:f.524b(1). Origin unknown. Cult. 1870. Zone V.

30. **F. potamóphila** Herd. Tree to 10 m.; brts. green, glabrous: lfts. 9–11, sometimes 7 or 13, stalked, broad-elliptic or elliptic-ovate, 2–5 cm. long, acute, narrowed into a stalk 5–10 mm. long, serrate, glabrous or pubescent along midrib beneath, stomatiferous on both sides: fr. elliptic-oblong, 3–5 cm. long, acute or obtuse. D.H.1:97,98. S.H.2:f.522b,523c(1). E.H.4:t.262, f.8. U.S.Inv.50:t.4(h). (*F. Regelii* Dipp.) Turkest. Cult. 1890. Zone V.

A related species is **F. sogdiàna** Bge. Small tree: lfts. 7–11, ovate-lanceolate, 3–6 cm. long, spinulose-dentate, quite glabrous: fr. oblong-obovate, 3 cm. long, obtuse or emarginate. S.H.2:f.524d(1). Turkest. Cult. 1890. Zone V or VI?

4. **FORSÝTHIA** Vahl. Golden-bell. Deciduous shrubs, glabrous, rarely lvs. pubescent; winter-buds with several outer scales, superposed and often laterally branching; brs. hollow or with lamellate pith: lvs. opposite, petioled, serrate or entire, occasionally 3-parted or 3-foliolate, thickish: fls. 1–6, axillary, heterostylous, before the lvs.; calyx deeply 4-lobed, persistent; corolla yellow, with 4 oblong lobes, longer than the campanulate tube usually striped orange within; stamens 2, inserted at the base of corolla, not or slightly exserted; style slender with 2-lobed stigma, in the macrostyle form longer, in the microstyle form shorter than the stamens: fr. a 2-celled dehiscent caps. with many winged seeds. Six species in E. Asia, one on S. E. Eu. (After Wm. Forsyth, prominent English horticulturist; 1737–1800.)—Ornamental shrubs very showy in early spring on account of their profuse yellow fls.; the lvs. remaining green until late in autumn and are not attacked by insects.

A. Brs. hollow, with solid pith at the nodes: lvs. often 3-foliolate.....1. *F. suspensa*
AA. Brs. at least partly with lamellate pith.
B. Mature brts. greenish or brownish: lvs. elliptic-ovate to lanceolate.
C. Lvs. serrate, at least above the middle, only occasionally entire, 7–14 cm. long.
D. Pith usually solid at the nodes, wanting or lamellate between the nodes; lvs. on vigorous brts. sometimes 3-parted.....2. *F. intermedia*
DD. Pith lamellate throughout, only at base of vigorous brs. wanting between the nodes: lvs. hardly ever 3-parted.....3. *F. viridissima*
CC. Lvs. usually entire or with few shallow teeth, 5–8 cm. long, never 3-parted. 4. *F. europaea*
BB. Mature brts. yellowish: lvs. ovate or broad-ovate, serrate, never 3-parted.5. *F. ovata*

1. **F. suspénsa** Vahl. Shrub to 3 m., with upright stems and spreading or pendulous brs.; brts. slightly 4-angled: lvs. ovate to oblong-ovate, serrate, 6–10 cm. long, acute, broad-cuneate or rounded at base: fls. 1–3, sometimes to 6, golden yellow, about 2.5 cm. long; calyx-lobes oblong, about as long as corolla-tube: fr. narrow-ovoid, slightly compressed, 1.5 cm. long. Fl.IV–V. S.Z.1:t.3(c). (*Syringa s.* Thunb.) China, cult. in Japan. Zone V.—Var. **Siebóldii** Zabel. Shrub with very slender pendulous brs., often trailing on the ground and rooting at the tips: lvs. usually simple, ovate or broad-ovate: fls. usually solitary; corolla-lobes rather broad, flat, slightly spreading. B.M.4995(c). F.S.12:t.1253(c). G.F.4:79. Gt.55:205. Gn.86:370(h). Gn. M.29:115(h). (*F. Sieboldii* Dipp.) Intr. from Jap. gardens in 1833. Zone V. This is the type of the species.—Var. **Fortùnei** Rehd. Vigorous upright shrub with arching or spreading brs.: lvs. ovate to oblong-ovate, on long shoots often 3-foliolate or 3-parted: corolla with narrow, spreading usually twisted lobes. Add.4:t.129(c). R.H.1861:291. F.E.31:421. Gn.73:243(h); 78:182(h). (*F. Fortunei* Lindl.) China. Intr. about 1860.—Forms of this var. are: Var. **variegàta** Butz. Lvs. variegated with yellow: fls. deep yellow. (f.

aureo-variegata Koehne.)—Var. **decípiens** Koehne. Fls. solitary, deep yellow, macrostyle; pedicels 1–2 cm. long. Gt.55:203.—Var. **pállida** Koehne. Fls. solitary, pale yellow.—Var. **atrocaùlis** Rehd. Young growth purplish and brts. dark purple: corolla-lobes 13–15 mm. broad. G.C.III.71:167. Intr. 1907. Zone VI?—Var. **pubéscens** Rehd. Young brts. and lvs. on both sides or only beneath short-pubescent, purplish when young. Intr. 1907. Zone VI.—Very showy in spring; the var. *Sieboldii* may be used as a climbing shrub for covering arbors, trellises, etc., and is very effective hanging down over rocks and walls.

2. × **F. intermèdia** Zabel (*F. suspensa* × *viridissima*). Shrub to 3 m.; similar in habit to *F. s.* var. *Fortunei*: lvs. usually ovate-oblong to oblong-lanceolate, sometimes 3-parted on vigorous shoots, 8–12 cm. long: fls. usually several; calyx shorter than corolla-tube. Fl.IV–V. Gt.34:t.1182;40:397. Gn.W.22:181. Gn.86:No.2622(h). Orig. before 1880.—Var. **vitellìna** Koehne. Corolla about 2.5 cm. long, deep yellow, macrostyle. Gt.55:227, 228. (*F. v.* Koehne.)—Var. **primulìna** Rehd. Fls. crowded at base of brts., pale yellow, with revolute lobes, microstyle.—Var. **densiflòra** Koehne. With spreading and pendulous brs.: fls. much crowded, rather pale, with rather flat, slightly recurved lobes, macrostyle. Gt.55:230, 231. (*F. d.* Koehne.)—Var. **spectàbilis** Spaeth. Corolla more than 3 cm. long, bright yellow, sometimes 5- or 6-merous; fls. crowded, microstyle. Gt.55:229. G.C.III.71:167. Gn.79:176. B.H.37:85(h). Jour. Internat. Gard. Club,3:479(h). (*F. s.* Koehne.) This is perhaps the most showy of all Forsythias.

3. **F. viridíssima** Lindl. Shrub with upright stems and brs., to 3 m.; brts. green: lvs. elliptic-oblong to lanceolate, rarely obovate-oblong, broadest about or above the middle, 8–14 cm. long, acute, cuneate, usually serrate only above the middle, sometimes nearly entire, dark green; petiole 6–12 mm. long: fls. 1–3, calyx-lobes oval, about half as long as corolla-tube; corolla 2–2.5 cm. long, bright yellow with a slight greenish tinge, the lobes narrow-oblong, revolute: fr. ovoid, rostrate, 1.5 cm. long. Fl.v. B.M.4587(c). F.S.3:t.261. B.R.33:39(c). Gn.33:563. B.S.1:560. China. Intr. 1844. Zone (V), VI.—Var. **variegàta** Hesse. Lvs. variegated with white.—Var. **koreàna** Rehd. Upright shrub with more or less spreading brs.: lvs. elliptic-ovate to ovate-oblong or oblong-lanceolate, broadest below the middle, 5–12 cm. long, usually serrate from about the middle, sometimes nearly entire, broad-cuneate; fls. bright yellow; calyx more than half as long as corolla-tube, corolla about 2.5 cm. long. N.K.10:t.2. Korea. Intr. 1917. Zone V.—This species is less handsome than *F. suspensa*. but the var. *koreana* is about as showy.

4. **F. europaèa** Deg. & Bald. Upright shrub to 2 m., with upright brts., green: lvs. ovate to ovate-lanceolate, 5–8 cm. long, acute, rounded or broad-cuneate at base, usually entire or at end of brts. with shallow teeth, rather thick; petiole 4–6 mm. long: fls. usually solitary, short-stalked; calyx shorter than corolla-tube; corolla yellow, about 2 cm. long, with narrow-oblong lobes 5–6 mm. wide: fr. ovoid, about 1.2 cm. long. Fl.v. B.M.8039(c). Gt.54:291. G.C.III.36:123. F.E.18:348. Albania. Intr. 1899. Zone V.—Less ornamental than other species.

5. **F. ovàta** Nakai. Shrub to 1.5 m., with spreading brs.; brts. grayish yellow or yellowish, gray when older: lvs. ovate or broad-ovate, 5–7 cm. long, abruptly acuminate, truncate or sometimes subcordate or broad-cuneate, serrate or sometimes nearly entire; petiole 8–12 mm. long: fls. solitary, short-stalked; sepals broad-ovate, half as long as corolla-tube; corolla amber-yellow, 1.5–2 cm. long, with broad-oblong lobes. Fl.IV–V. N.K.10:t.3.

Gn.88:273 Korea. Intr. 1917. Zone V.—Distinct and handsome species, the earliest to bloom.

5. **SYRÍNGA** L. Lilac. Deciduous shrubs or small trees; winter-buds ovoid, with several outer scales, the terminal bud often wanting: lvs. opposite, petioled, entire or sometimes lobed or pinnate: fls. perfect, in terminal or lateral panicles on the brs. of the previous season; calyx small, campanulate, 4-toothed, irregularly dentate or nearly truncate, small, persistent; corolla salver-shaped, with cylindric tube and 4 spreading valvate lobes; stamens 2, included or exserted; style with 2-lobed stigma, not exceeding the stamens; ovary 2-celled: fr. an oblong, leathery loculicidal caps. with 2 winged seeds in each cell. (Probably from Greek *syrinx*, pipe, in reference to the stems of Philadelphus to which the name originally had been applied, until Dodoens transferred it to this genus.) Including *Ligustrina* Rupr. About 25 species in Asia and S. E. Eu.—Ornamental shrubs with large and showy panicles of often fragrant fls. in spring and early summer.

A. Corolla-tube much longer than calyx; anthers subsessile. (Subgen. I. EUSYRINGA K. Koch.)
  B. Panicles from terminal buds leafy at base. (Group 1. Villosae Schneid.)
    C. Panicles upright.
      D. Lvs. papillose, glaucous and glabrous beneath.
        E. Anthers exserted about ½; corolla-lobes finally reflexed.....1. *S. emodi*
        EE. Anthers only reaching the mouth; corolla-lobes upright-spreading.
2. *S. yunnanensis*
      DD. Lvs. not papillose beneath, green to glaucescent, usually pilose beneath at least on or along the midrib.
        E. Corolla-lobes more or less upright; tube gradually widened above the middle; anthers much below the mouth.
          F. Lvs. 6–12 cm. long, glaucescent beneath.....3. *S. Josikaea*
          FF. Lvs. 10–16 cm. long, grayish green beneath.....4. *S. Wolfii*
        EE. Corolla-lobes spreading; anthers near mouth.
          F. Lvs. glabrous or pubescent only on veins beneath.
            G. Lvs. rounded or broad-cuneate at base, usually ovate...5. *S. Sweginzowii*
            GG. Lvs. cuneate at base, elliptic to oblong, sometimes obovate....6. *S. villosa*
          FF. Lvs. pubescent beneath.....7. *S. tomentella*
    CC. Panicles pendulous or nodding.
      D. Fls. whitish inside, pink outside, carmine in bud, in long pendulous rather slender panicles to 18 cm. long.....8. *S. reflexa*
      DD. Fls. purplish pink, paler outside, in nodding compact panicles 8–14 cm. long.
9. *S. Komarowi*
  BB. Panicles from lateral buds; terminal bud usually wanting. (Group 2. Vulgares Schneid.)
    C. Lvs. pubescent at least on midrib beneath: anthers usually violet.
      D. Brts. short-pubescent: lvs. pubescent above.
        E. Infl. short-pilose 8–12 cm. long; pedicels short-pilose: lvs. 3–6 cm. long.
10. *S. Julianae*
        EE. Infl. puberulous, 10–15 cm. long; pedicels glabrescent: lvs. 5–10 cm. long.
11. *S. velutina*
      DD. Brts. glabrous or only puberulous when young.
        E. Corolla-tube 1 cm. or less long.
          F. Lvs. usually pubescent beneath, 1–4 cm. long: infl. short and dense.
12. *S. microphylla*
          FF. Lvs. glabrate beneath except at base of veins and midrib, 2.5–7 cm. long: infl. long and slender.....13. *S. Palibiniana*
        EE. Corolla-tube very slender, longer than 1 cm.; anthers much below the mouth: lvs. glabrate beneath.
          F. Lvs. with 3–5 pairs of veins, abruptly contracted at base, 3–7 cm. long: fls. pale lilac.....14. *S. pubescens*
          FF. Lvs. with 2–3 pairs of veins, cuneate, 2–4 cm. long: fls. purple-lilac.
15. *S. Meyeri*
    CC. Lvs. glabrous or if pubescent broad-ovate and truncate or subcordate at base.
      D. Lvs. entire (or 3–7-lobed in var. of No. 18).
        E. Lvs. broad-ovate or ovate, truncate or subcordate, sometimes abruptly broad-cuneate at base.
          F. Lvs. broad-ovate, subcordate at base.....16. *S. oblata*
          FF. Lvs. ovate, subcordate to broad-cuneate at base.....17. *S. vulgaris*
        EE. Lvs. oblong-ovate to oblong-lanceolate, cuneate at base.
          F. Lvs. 4–7 cm. long, always entire: infl. large and loose.....18. *S. chinensis*
          FF. Lvs. 2–4 cm. long, often pinnately lobed: infl. small.....19. *S. persica*
      DD. Lvs. pinnate with 7–9 lfts.: panicles small.....20. *S. pinnatifolia*

AA. Corolla-tube not or little longer than calyx; anthers on slender filaments. (Subgen. II. LIGUSTRINA Rupr.)
B. Lvs. narrowed at base, ovate to ovate-lanceolate.....21. *S. pekinensis*
BB. Lvs. usually rounded at base, ovate or broad-ovate.
C. Lvs. glabrous beneath, abruptly acuminate: tall shrub.....22. *S. amurensis*
CC. Lvs. pubescent beneath, gradually acuminate: tree.....23. *S. japonica*

1. **S. emòdi** Wall. HIMALAYAN L. Shrub to 5 m., with upright rather stout brs.; brts. brownish or dark olive green, dotted with pale lenticels: lvs. elliptic to oblong, 8–15, rarely to 20 cm. long, dark green above, glaucous beneath, glabrous; petiole 1–1.5 cm. long: fls. pale lilac or whitish, not pleasantly scented, in puberulous or glabrescent rather broad and dense panicles 8–15 cm. long; calyx puberulous; corolla with narrow tube 8 mm. long and lanceolate acute lobes: fr. cylindric-oblong, about 1.5 cm. long, acuminate, smooth or nearly so. Fl.VI. B.R.31:6(c). R.H.1876:368. Gn.39:106. B.S.2:567. E.P.IV.243,1:82,f.3a-b. (*S. villosa* var. *emodi* Rehd.) Afghan., W. Himal. to Kumaon. Intr. about 1840. Zone VI.—Var. **aùreo-variegàta** Lav. Lvs. variegated with yellow.—Var. **aùrea** Simon-Louis. Lvs. yellow.

2. **S. yunnanénsis** Franch. YUNNAN L. Upright shrub to 3 m., with rather slender brs.; young brts. glabrous, red-brown, with conspicuous lenticels: lvs. elliptic-oblong to elliptic-lanceolate, 3–8 cm. long, short-acuminate, cuneate, minutely ciliolate, glaucous beneath; petiole 5–10 mm. long, glabrous, purple: fls. pink, in puberulous slender panicles 8–15 cm. long; calyx glabrous with short teeth; corolla with slender tube about 5 mm. long and acute upright-spreading lobes; anthers reaching the mouth: fr. about 1.5 cm. long, pointed, smooth. Fl.VI. S.H.2:f.488p-r,489g. Yunnan. Intr. before 1908. Zone V. —Loosely branched shrub, one of the less showy species.

3. **S. Josikaèa** Jacq. HUNGARIAN L. Shrub to 4 m., with rather stout brs. slightly pubescent at first, sparingly lenticellate: lvs. broad-elliptic to elliptic-oblong, 6–12 cm. long, acute to acuminate, broad-cuneate to rounded at base, ciliolate, dark green and lustrous above, glaucescent beneath, and sparingly hairy on the veins or nearly glabrous; petiole about 1 cm. long: fls. lilac-violet, slightly fragrant, subsessile or short-stalked, in rather narrow panicles 10–18 cm. long; calyx pubescent; corolla 1–1.5 cm. long, with ovate upright-spreading lobes; anthers inserted much below the mouth: fr. acute, smooth, about 1 cm. long. Fl.VI. B.M.3278(c). B.R.1733(c). Hungary, Galicia. Intr. about 1830. Zone V.—Var. **pállida** Jaeg. Fls. pale violet.—Var. **rúbra** Hartwig. Fls. reddish violet.—Var. **exímia** Froebel. Fls. reddish rose, changing to light pink, in compact large panicles. G.C.III.42:280. M.G.16:561. M.D.1907:262.—Var. **Zabèli** Schelle is similar, but fls. reddish lilac.—Similar to *S. villosa* but less handsome.

S. J. × *villosa* = *S. Henryi;* see under No. 6.

4. **S. Wólfii** Schneid. Upright shrub to 6 m.; brts. glabrous, sparingly lenticellate: lvs. elliptic-oblong, 10–16 cm. long, acute, or short-acuminate, cuneate or broad-cuneate, grayish green benath, glabrous except slightly villous along the veins beneath and on margin; petiole 1–1.5 cm. long: fls. lilac, fragrant, stalked, in large slightly pubescent panicles 20–30 cm. long; calyx glabrous or short-pilose; corolla 1.5–1.8 cm. long; lobes ovate-oblong, with a conspicuous incurved point; anthers inserted much below the mouth: fr. obtuse, 1.4 cm. long, smooth. Fl.VI. N.K.10:t.24. S.H.2:f.489i-k,490o-r. (*S. formosissima* Nakai.) Manch., Korea. Cult. 1910. Zone V.

5. **S. Sweginzòwii** Koehne & Lingelsh. Shrub to 3 m.; young brts. purple-brown, glabrous: lvs. oblong or ovate, 5–10 cm. long, usually abruptly acuminate, broad-cuneate to nearly rounded at base, deep green above, light green

beneath and pilose on the veins near base or nearly glabrous, thin; petiole 7–10 mm. long: fls. reddish lilac or pale lilac, fragrant, in glabrous or finely puberulous panicles 15–20 cm. long; corolla-tube 8 mm. long, with acutish ovate-oblong lobes; anthers near the mouth; fr. about 1 cm. long, acute, smooth. Fl.vi. G.C.III.57:344;64:27. M.D.1910:112. G.W.28:411. M.G. 40:399. N. China. Cult. 1910. Zone V.—Var. **supérba** Lemoine is scarcely different.

6. **S. villòsa** Vahl. Bushy shrub of dense habit, to 3 m.; brts. stout, lenticellate, glabrous or slightly pubescent when young: lvs. broad-elliptic to oblong, 5–18 cm. long, acute at ends, dull dark green above, glaucescent beneath and usually pubescent near the midrib, rarely glabrous; petiole 1–2 cm. long: fls. rosy-lilac to whitish, short-stalked, in pyramidal rather dense usually pubescent panicles 8–18 cm. long; calyx slightly pubescent or glabrous; corolla-tube about 1.2 cm. long, with spreading obtuse lobes; anthers inserted near mouth; fr. 1–1.5 cm. long, obtuse or acutish, smooth or nearly so. Fl.v–vi. B.M.8292(c). R.H.1888:492,t(c);1914:332(h). G.F.1:521. Gn.39:91. Gt.44:500. H.B.3:279(h). (*S. Bretschneideri* Lemoine, *S. Emodi* var. *rosea* Cornu, *S. pubescens* Hort., not Turcz.) N. China. Intr. 1885. Zone V.—Ornamental lilac chiefly valued for its dense habit and late and profuse fls.

S. v. × *Josikaea* = **S. Hénryi** Schneid. Similar to *S. villosa*, but panicle larger and looser; corolla pale violet-purple; tube gradually widened above the middle. R.H.1902:40,t(c). J.L.27:800.—Var. "Lutèce" is the type of this hybrid.

7. **S. tomentélla** Bur. & Franch. Slender shrub to 3 m.; brts. brownish, thinly pubescent, later brown, lenticellate: lvs. elliptic to oblong-lanceolate, 3–10 cm. long, acute or acuminate, cuneate, dark green and slightly pubescent above chiefly on the veins, paler beneath and soft-pubescent, rarely only on the veins, ciliolate; petiole about 1 cm. long, pubescent: fls. lilac or whitish, subsessile or short-stalked in a loose pubescent panicle, 10–16 cm. long, its lateral brs. forming dense spikes of subsessile fls. in crowded whorls; calyx pilose; corolla-tube about 1 cm. long, with oblong-lanceolate acute lobes; anthers slightly exserted; fr. 1–1.2 cm. long, acuminulate, smooth. Fl.vi. B.M.8739(c). Gn.84:35;87:51. (*S. albo-rosea* N. E. Br., *S. Adamiana* Balf. f. & W. W. Sm., *S. Wilsonii* Schneid.) W. China. Intr. 1904. Zone V.—Var. **Rehderiàna** Rehd. Brts. and infl. densely tomentulose: lvs. soft-pubescent beneath, usually rounded at base; petiole 6–8 mm. long; infl. large and loose; anthers not reaching the mouth. (*S. R. Schneid.*) W. China. Doubtful if in cult.

8. **S. refléxa** Schneid. Nodding L. Shrub to 4 m., with rather stout brs.; brts. gray or purple-gray, lenticellate; older brs. pale gray, not fissured: lvs. ovate-oblong to oblong-lanceolate, sometimes elliptic-obovate, 8–15 cm. long, acuminate, cuneate, glabrous above, villous beneath, chiefly along the veins; petioles 1–2 cm. long: infl. narrow, often nearly cylindric, nodding or pendulous, 10–18 cm. long, and 4–5 cm. through, sparingly villous; calyx often nearly glabrous; corolla, pinkish outside, white inside, usually carmine in bud, about 1 cm. long; lobes slightly spreading, with incurved tips; anthers reaching the mouth or slightly exserted: fr. oblong, 1.2 cm. long, obtusish and mucronate, smooth or slightly warty, reflexed on the pendulous infl. Fl.vi. B.M.8869(c). G.W.28:409(h). M.G.40:398(h). C. China. Intr. 1904. Zone V.—Very distinct and handsome species with pink fls. carmine in bud, in long pendulous panicles.

9. **S. Komaròwi** Schneid. Shrub to 5 m., with rather stout lenticellate

brs.; young brts. pubescent, older brs. with gray-brown fissured bark becoming scaly: lvs. ovate-oblong to oblong-lanceolate, 10–16 cm. long, acuminate, cuneate, nearly glabrous above, pubescent beneath, at least on the veins; petiole 1–2 cm. long: panicles nodding, compact, cylindric to oblong-ovoid, 8–14 cm. long; calyx and pedicels slightly pubescent to glabrous; corolla purple-pink, lighter outside, lobes upright, not incurved; anthers usually slightly exserted: fr. usually slightly warty. S.H.2:f.489b-c,490s-u. W. China. Intr. 1911.—Var. **Sargentiàna** Schneid. Lvs. pubescent beneath: panicles usually longer, more pubescent; calyx densely pilose. (*S. S.* Schneid.) Intr. 1911.—Similar to the preceding species, but less handsome.

10. **S. Juliànae** Schneid. Spreading shrub to 2 m.; brts. densely short-pilose: lvs. elliptic-ovate, 3–6 cm. long, acute or acuminate, broad-cuneate, dark green and short-pubescent above, paler and villous-pubescent beneath, more densely on the veins; petiole 4–8 mm. long, pubescent: fls. lilac-purple, pale inside, fragrant, in slightly pubescent panicles 5–10 cm. long, purplish-violet like the glabrous calyx; corolla-tube 6–8 mm. long, with ovate-oblong spreading lobes; anthers not reaching the mouth: fr. about 1 cm. long, acuminate, verrucose. Fl.v–vi. B.M.8423(c). B.S.2:568. Gn.79:194. (*S. verrucosa* Schneid.) W. China. Intr. 1900. Zone V.—A handsome graceful species with fragrant fls.

A closely related species is **S. Potanìni** Schneid. Shrub to 3 m.: lvs. ovate or elliptic-ovate, 3–6 cm. long, rather densely pubescent above, densely villous-pubescent beneath, usually short-acuminate; petiole 2–5 mm. long: infl. 6–10 cm. long; calyx often pilose: fr. 10–15 mm. long, short-acuminate, smooth. B.M.9060 (c). W. China. Intr. about 1918.—Another related species is **S. pinetòrum** W. W. Sm. Young brts. densely pilose; lvs. ovate to ovate-lanceolate, 2–3.5 cm. long, sparingly pilose or glabrous above, pilose on the veins beneath, petiole 2–5 mm. long; panicle 10–18 cm. long, calyx glabrous, with ciliolate teeth. S. W. China. Intr. about 1915. Zone VI?

11. **S. velutìna** Komar. Shrub to 3 m.; brts. slightly pubescent and often glandular: lvs. elliptic to ovate-oblong, 6–10 cm. long, acuminate, broad-cuneate, slightly pubescent above, densely so beneath; petiole 5–10 mm. long, pubescent: fls. lilac, in pubescent panicles 6–12 cm. long, pubescent; calyx pubescent or nearly glabrous; corolla-tube slender, 8–10 mm. long, with narrow acute recurved lobes; anthers not reaching the mouth, violet: fr. oblong, about 1 cm. long, acute, warty. Fl.v. Act. Hort. Petr.25: t.2. N.K.10:20. S.H.2:f.488e-h,489n-o. (*S. Koehneana* Schneid.) N. China, Korea. Cult. 1910. Zone V or IV.

12. **S. microphýlla** Diels. Small shrub; young brts. slightly pilose; lvs. orbicular-ovate to elliptic-ovate,1–4 cm. long, obtuse or abruptly acuminate, broad-cuneate to rounded at base, slightly pilose above, grayish green and pubescent beneath, at maturity only on the veins, ciliolate; petiole 5–10 mm. long: fls. pale lilac, in loose pubescent panicles 3–7 cm. long; calyx pubescent or glabrescent; corolla-tube slender, 1 cm. long, with ovate-lanceolate acute lobes: fr. slender, 1–1.5 cm. long, acuminate, often curved, warty. Fl.vi. S.H.2:f.486z-z^2,487n-p. E.P.IV.243,1:87. N. China. Intr. 1914. Zone V.

13. **S. Palibiniàna** Nakai. Shrub to 3 m., with rather slender upright brs.; brts. slightly puberulous or nearly glabrous, with few small lenticels, purplish at first, later light brown: lvs. broad-elliptic or elliptic-ovate or elliptic, 2.5–7 cm. long, short-acuminate to obtusish, broad-cuneate or rounded, ciliolate, light green beneath and densely pilose on midrib and veins near base; petiole 5–10 mm. long, pilose: fls. pale lilac or whitish, subsessile, in loose usually puberulous panicles 6–14 cm. long; calyx glabrous, usually purple; corolla-tube slender, 8 mm. long, with short obtuse finally recurved lobes; anthers

not reaching the mouth; caps. 1 cm. long, acuminate, warty. Fl.v–vi. N.K. 10:t.21. Korea. Intr. 1917. Zone V.—Var. **Kamibayâshii** Nakai. Lvs. broad-ovate: infl. denser to 20 cm. long, more pubescent: fr. 1–1.5 cm. long, obtusish. N.K.10:t.22. Korea. Intr. 1917. Zone V.

14. **S. pubéscens** Turcz. Shrub to 2 m.; brts. slender, slightly quadrangular, glabrous: lvs. orbicular-ovate to rhombic-ovate or ovate, 3–7 cm. long, short-acuminate, broad-cuneate, ciliolate, dark green and glabrous above, pubescent beneath chiefly on the veins; petiole 6–12 mm. long: fls. pale lilac, fragrant, in rather dense glabrous panicles 7–12 cm. long; corolla-tube slender, 1.2–1.5 cm. long, with spreading narrow lobes; anthers inserted much below the mouth: fr. about 1 cm. long, obtusish, warty. Fl.iv–v. B.M.7064(c). G.F.1:415;6:266. G.C.III.38:123. Gn.M.34:43(h). H.B.3:233(h). (*S. villosa* Decne., not Turcz.) N. China. Intr. 1880. Zone V.—Handsome lilac valued for its early fragrant fls.

15. **S. Meÿeri** Schneid. Small dense shrub; young brts. slightly quadrangular, pubescent: lvs. elliptic-ovate to sometimes elliptic-obovate, 2–4 cm. long, acute or obtusish, broad-cuneate, glabrous above, scarcely paler beneath and pubescent on the veins near base, with 2 pairs of veins from base to apex; petiole 5–10 mm. long: fls. violet in dense puberulous panicles 3–8 cm. long, usually several pairs at end of brs.; calyx dark violet, glabrous; corolla-tube very slender, about 1.5 cm. long, scarcely dilated at apex, with spreading acute lobes 3–4 mm. long; anthers inserted below the mouth: fr. verrucose. Fl.v–vi. N. China. Intr. 1908. Zone V.—Compact low shrub, flowering when not more than 25 cm. tall, very distinct with its dense panicles of violet fls.

16. **S. oblàta** Lindl. Shrub or small tree to 4 m.; brts. rather stout, glabrous: lvs. orbicular-ovate or reniform, often broader than long, 4–10 cm. broad, abruptly acuminate, cordate to subcordate, glabrous; petiole 1–2 cm. long: fls. pale to purple-lilac, in dense rather broad panicles 6–12 cm. long; calyx slightly glandular; corolla-tube 10–12 mm. long, with spreading obtuse lobes: fr. compressed, 1–2 cm. long, acute, smooth. Fl.iv–v. B.M.7806(c). G.F.1:221. G.W.5:549. (*S. vulgaris* var. *o.* Franch.) N. China. Intr. 1856. Zone V.—Var. **affinis** Lingelsh. Lvs. smaller, minutely pubescent beneath, on flowering brts. often glabrous, ciliolate: fls. white. R.H.1908:301. (*S. affinis* L. Henry, ? *S. oblata alba* Hort.) Intr. 1880.—Var. **Giráldii** Rehd. Lvs. more gradually acuminate, minutely puberulous or sometimes pubescent beneath, ciliolate, or glabrous on flowering brs.: fls. purple-lilac, in slender panicles 10–15 cm. long; rachis and calyx purple-violet. R.H.1909:335. (*S. G.* Lemoine.) N. China. Intr. about 1895.—Var. **dilatàta** Rehd. Lvs. ovate, to 12 cm. long, long-acuminate, usually truncate at base, quite glabrous: infl. loose; corolla-tube slenderer, 10–12 mm. long. N.K.10:t.18. (*S. d.* Nakai.) Korea. Intr. 1917.—The type is a compact early blooming shrub with handsome foliage turning vinous-red in autumn; the vars. are taller and more loosely branched.

S. o. × *vulgaris* = **S. hyacinthiflòra** Rehd. Intermediate between the parents, with broad-ovate lvs. turning purplish in autumn; only known in the double form, var. **plèna** Lemoine. There are also hybrids of var. *Giraldii*, as "Lamartine" and "Mirabeau" of taller, slenderer habit and with single fls.

17. **S. vulgàris** L. Upright shrub or small tree to 7 m.; brts. glabrous: lvs. ovate or broad-ovate, 5–12 cm. long, acuminate, truncate or subcordate to broad-cuneate, glabrous; petiole 1.5–3 cm. long: fls. very fragrant, usually lilac, in panicles 10–20 cm. long; corolla-tube slender, about 1 cm. long, with spreading ovate obtuse lobes: fr. 1–1.5 cm. long, acute, smooth.

Fl.IV–V. B.M.183(c). R.I.17:t.32(c). F.E.22:5(h). M.G.14:205(h). S. E. Eu. Cult. 1597. Often escaped from cult.—Var. **alba** West. Fls. white: brts. yellowish gray; winter-buds yellowish green. Blooms a week earlier than other vars.—Var. **coerùlea** West. Fls. blue, in rather loose panicles. This is the typical form.—Var. **purpúrea** West. Fls. purplish red, in rather dense panicles.—Var. **violàcea** Ait. Fls. violet-lilac, in rather loose panicles. —Var. **plèna** Oudin. Fls. blue double. (Var. *fl. pleno* Kirchn.)—One of the most popular ornamental shrubs with numerous horticultural forms mostly of French origin.

18. **S. chinénsis** Willd. (*S. persica* × *vulgaris*). Shrub to 5 m., with slender spreading and often arching brs., glabrous: lvs. ovate-lanceolate, 4–8 cm. long, acuminate, cuneate; petiole about 1.5 cm. long: fls. purple-lilac, in large and rather loose glabrous panicles; corolla-tube 7–8 mm. long, with 4 ovate obtuse or acutish lobes. Fl.v. R.H.1883:8. (*S. rothomagensis* De Launay, *S. dubia* Pers., *Lilac media* Dum.-Cours., *L. varina* Dum.-Cours.) Orig. about 1777. Zone V.—Var. **alba** Rehd. Fls. white. (*S. rothomagensis alba* Kirchn., *S. correlata* A. Br.)—Var. **metènsis** Simon-Louis. Fls. rosy-lilac.—Var. **Saugeàna** Rehd. Fls. lilac-red. (Var. *rubra* Lodd., *S. rothomagensis S.* Loud.) —Var. **dúplex** Lemoine. Fls. purplish lilac, double.

19. **S. pérsica** L. Persian L. Shrub to 2 m., with upright or arching brs., glabrous: lvs. lanceolate, 3–6 cm. long, acuminate, cuneate, sometimes 3-lobed or pinnatifid; petiole 5–12 mm. long: fls. pale lilac, fragrant, in loose broad glabrous panicles 5–8 cm. long; pedicels as long or longer than calyx; corolla-tube slender, about 1 cm. long, with ovate acutish lobes: fr. 4-angled, 8–10 mm. long, obtusish, smooth. Fl.v. B.M.486(c). S.H.2:f.485k-s,486n-q. W.A.50,t(h). Persia to N. W. China. Intr. about 1640. Zone V.—Var. **integrifòlia** Vahl. Lvs. all or almost all undivided. The typical form.—Var. **alba** West. Fls. white or whitish. (*S. Steencruysii* Hort.)—Var. **laciniàta** West. Lvs. all or partly 3–9-lobed; of dwarfer habit and usually with smaller panicles. R.H.1901:40,41. L.B.1107(c). B.S.2:570. (*S. pteridifolia* Hort., *S. filicifolia* Hort., var. *pinnata* Jacques.) Occurs spontaneously in N. W. China.—Sometimes confused with the following species, but easily distinguished by the decurrent leaf-segments and the short margined petioles.

20. **S. pinnatifòlia** Hemsl. Pinnate L. Upright shrub to 3 m.; usually with terminal bud developing into a leafy shoot: lvs. pinnate, 4–8 cm. long; lfts. 7–11, ovate to ovate-lanceolate, 1–3 cm. long, only the upper pairs decurrent, the lower ones contracted at base, acute, ciliolate; petiole 1–2 cm. long: fls. white, tinged pale lilac, in panicles 4–7 cm. long; calyx irregularly dentate; corolla-tube slender, about 1 cm. long, with recurved obtusish lobes. Fl.v–VI. G.C.III.55:269. E.P.IV.243,1:91. W. China. Intr. 1904. Zone V. —Interesting shrub on account of its pinnate lvs., but fls. not conspicuous.

21. **S. pekinénsis** Rupr. Large shrub to 5 m., with slender spreading brs. brownish red when young: lvs. ovate to ovate-lanceolate, 5–10 cm. long and 2–3.5 cm. broad, acuminate, cuneate, dark green above, grayish green beneath and scarcely veined, quite glabrous; petiole 1.5–2.5 cm. long: fls. yellowish white, in large glabrous panicles 8–15 cm. long: corolla 6 mm. across; stamens about as long as limb: fr. oblong, acute, 1.5–2 cm. long, warty or smooth. Fl. VI. G.F.3:165;7:385. M.G.14:425. S.L.405(h). (*S. amurensis* var. *p.* Maxim., *Ligustrina p.* Reg.) N. China. Intr. 1881. Zone V.—Var. **péndula** Dipp. With slender pendulous brs. W. Am. Sci.4:39(h).—Handsome large shrub with profuse yellowish white fls.

22. **S. amurénsis** Rupr. Amur L. Shrub to 4 m., with upright or spread-

ing brs.: lvs. broad-ovate to ovate, 5–12 cm. long and 3.5–6.5 cm. broad, abruptly acuminate, usually rounded or truncate at base, bright green above, grayish green and reticulate beneath and glabrous; petiole 1–2 cm. long: panicles rather loose, large, 10–15 cm. long; stamens almost twice as long as limb: fr. oblong, 1.5 cm. long, obtusish, smooth. Fl.VI. Gt.12:t.396;45:64. G.F.2:271. Gn.12:623, 624. R.H.1877:453–5. (*S. rotundifolia* Decne., *S. ligustrina* Hort., *S. sibirica* Hort. partly, *Ligustrina a.* var. *mandshurica* Maxim., *L. a.* Reg.) Manch., N. China. Intr. about 1855. Zone IV.—Similar to the preceding, but of more upright and stouter habit.

23. **S. japónica** Decne. JAPANESE L. Tree to 10 m., with short trunk and ovoid or round head: lvs. broad-ovate to ovate-oblong, 5–14 cm. long, acuminate, rounded or subcordate, bright green above, pale green and pubescent beneath when young; petiole stout, 1–2 cm. long: panicle pubescent or glabrous, 15–30 cm. long; stamens slightly longer than limb: fr. 1.2–2 cm. long, acute or obtusish, warty. Fl.VI–VII. B.M.7534(c). S.I.2:t.63(c). G.C.II. 25:561. G.F.2:293(h). Gn.76:356(h). M.G.14:424(h),40:398(h). (*S. amurensis* var. *j.* Nakai, *Ligustrina amurensis* var. *j.* Maxim.) Japan. Intr. 1876. Zone V.—Handsome small tree valuable for its late blooming season.

6. **PHILLÝREA** L. Evergreen shrubs or small trees: lvs. opposite, short-petioled, serrate or entire: fls. small, whitish, dioecious, in axillary short, usually clustered, racemes; calyx 4-toothed; corolla 4-lobed, the lobes imbricate in bud, longer than tube; stamens 2, exserted, on short filaments; style shorter than stamens; ovary 2-celled, with 2 pendulous ovules in each cell: fr. a 1-seeded black drupe. (The ancient Greek name of the plant.) Four species in the Mediterr. region.

A. Lvs. 1–6 cm. long: fr. subglobose to ovoid.....1. *P. latifolia*
AA. Lvs. 7–12 cm. long: fr. oblong, about 1 cm. long.....2. *P. decora*

1. **P. latifòlia** L. Spreading shrub or small tree to 10 m.; young brts. puberulous: lvs. ovate or elliptic-ovate, rarely ovate-oblong, 2–6 cm. long, acute, subcordate or rounded to broad-cuneate, usually sharply or sometimes indistinctly serrate, dark green and lustrous above, light green beneath and usually pubescent on midrib, with 5–12 pairs of veins; petiole very short, puberulous: fls. greenish white, about 5 mm. across, in small clusters; pedicels 2–5 mm. long; corolla-lobes ovate: fr. subglobose, about 6 mm. across, blue-black. Fl.V–VI. R.I.17:t.34.f.1–III(c). H.W.3:123. S.H.2:f.493l-s. S. Eu., Asia Minor. Cult. 1597. Zone VIII.—Var. **spinòsa** West. Lvs. spinulose-serrate.—Var. **mèdia** Schneid. Usually shrubby or tree to 6 m.; lvs. elliptic-ovate to oblong-ovate or ovate-lanceolate, 1.5–5 cm. long, crenate-serrulate or entire: fr. often ovoid and pointed. R.I.17:t.34,f.3(c). G.O.t.116(c). N.D.2:t.27(c). (*P. m.* L.) S. Eu., Asia Minor. Intr. before 1597. Zone VII. —Densely branched and small-leaved evergreen shrubs or trees of little ornamental value; very variable in the shape of their lvs.

A closely related species is **P. angustifòlia** L. Shrub to 3 m.; brts. glabrous; lvs. oblong-lanceolate to linear-lanceolate, 2–6 cm. long, acute, cuneate, usually entire, yellowish green and glabrous beneath, with 5–6 pairs of veins: fr. globose or globose-ovoid, pointed. R.I.17:t.35,f.3,4(c). G.O.t.115(c). (*P. vulgaris* var. *a.* Caruel.) S. Eu., N. Afr. Cult. 1597. Zone VIII?

2. **P. decòra** Boiss. & Bal. Shrub to 3 m., with upright-spreading brs.; brts. glabrous: lvs. oblong to oblong-lanceolate, acuminate, broad-cuneate, entire, rarely remotely serrate, dark green and lustrous above, yellowish green beneath, glabrous: petiole 1–1.5 cm. long: fls. white, in dense clusters; pedicels 3–15 mm. long; corolla 6–7 mm. across, with narrow-oblong lobes:

fr. oblong-ovoid, purplish black, about 1.5 cm. long. Fl.IV–V; fr.VIII–IX. B.M.6800(c). G.C.III.4:673;16:369. M.G.13:349(h). Gs.2:7(h),80. (*P. Vilmoriniana* Boiss. & Bal., *P. laurifolia* Hort.) W. Asia. Intr. 1867. Zone VI or (V).—This is the handsomest and hardiest species of the genus.

7. **OSMÁNTHUS** Lour. Evergreen shrubs or small trees; winter-buds with 2 outer scales, sometimes superposed: lvs. opposite, short-petioled, entire or serrate: fls. perfect, polygamous or dioecious, in axillary or terminal cymes or panicles; calyx short, 4-toothed; corolla with short, rarely long tube and 4 imbricate lobes; stamens 2, rarely 4, included; style cylindric, with capitate stigma, usually about as long as tube; ovary 2-celled, each cell with 2 ovules: fr. an ovoid drupe with a one-seeded stone. (Greek *osme*, fragrance, and *anthos*, flower; in reference to the fls. of *O. fragrans*.) About 10 species in E. and S. Asia, Polynesia and one in N. Am.

O. ilicifòlius Mouillef. Shrub or small tree to 6 m.: lvs. elliptic or ovate to elliptic-oblong, 2–6 cm. long, spiny-pointed, cuneate or broad-cuneate, with 1–4 pairs of strong spiny teeth, rarely entire, lustrous and dark green above, yellowish green and veined beneath; petiole 8–12 mm. long: fls. fragrant, in axillary clusters; pedicels 3–8 mm. long; sepals triangular, entire; corolla divided nearly to base, with reflexed lobes: fr. ovoid, about 1.5 cm. long, bluish black. Fl.VI–VII. S.I.1:t.82(c). G.C.II.7:239,f.38. Kew Bull. 1911:177,t. S.L.278(h). (*O. Aquifolium* Benth. & Hook., *Olea Aquifolium* Sieb. & Zucc., *Olea ilicifolia* Hassk.) Japan. Intr. 1856. Zone VI.—Var. **variegàtus** Rehd. Lvs. variegated with white (*O. aquifolius v.* Moore).—Var. **aûreus** Rehd. Lvs. variegated with yellow. (*O. Aquifolium* var. *a.* Bailey.) —Var. **purpúreus** Rehd. Lvs. dark purple at first, later green with purple tinge. (*O. Aquifolium* var. *i. p.* Nichols., *O. A.* var. *atropurpureus* Schneid.) —Var. **myrtifòlius** Mouillef. Lvs. elliptic to elliptic-oblong, 2.5–4.5 cm. long, entire, acute or acuminate. Gn.50:86. (*O. Aquifolium* var. *m.* Dipp.)—Var. **rotundifòlius** Rehd. Lvs. broad-elliptic, often obovate, about 2.5 cm. long, entire or with short obtusish teeth; like the preceding a dwarf slow-growing form. S.H.2:f.496k-l. (*O. Aquifolium* var. *r.* Dipp.)—Evergreen shrubs with handsome lustrous lvs.

The following species may prove hardy within our area, but *O. fragrans* Lour. and *O. americanus* Benth. & Hook. are too tender.—**O. Fortùnei** Carr. (*O. fragrans* × *ilicifolius*). Shrub to 2, rarely to 6 m.; lvs. elliptic-ovate to oblong-ovate, 6–10 cm. long, cuneate, with usually 6–10 pairs of spiny teeth: fls. very fragrant; sepals denticulate. R.H.1864:70. G.C.II.7:239. Kew Bull.1911:177,t. (*O. japonicus* Mak.) Intr. from Japan in 1856.—**O. armàtus** Diels. Shrub to 5 m.; young brts. puberulous: lvs. oblong-lanceolate to lanceolate, 8–14 cm. long, broad-cuneate to subcordate, remotely spiny-toothed, reticulate; petiole 3–6 mm. long, puberulous, reddish: fls. fragrant, slender-stalked. Fl.IX–X. W. China. Intr. 1902. G.C.III. 68:117(h).—**O. Delavaỳi** Franch. Shrub to 2 m.; young brts. finely pubescent: lvs. ovate to elliptic-ovate, 1–2.5 cm. long, usually cuneate, sharply or indistinctly toothed: fls. fragrant in 4–8-fld. terminal and axillary cymes; corolla-tube cylindric about 1 cm. long, with reflexed oblong lobes: fr. globose-ovoid, bluish black. Fl.IV. B.M.8459(c). M.O.353. Gn.79:232(h);83:185;88:757(h). B.S.2:112. W. China. Intr. 1890.

8. **FORESTIÈRA** Poir. Deciduous, rarely evergreen trees or shrubs: lvs. opposite, short-petioled, entire or serrate: fls. polygamo-dioecious, apetalous, small, in lateral clusters or racemes on brts. of the previous season; sepals 4–6, unequal, fugacious, sometimes wanting; stamens 2–4; ovary 2-celled, with 2 pendulous ovules in each cell; style slender, with capitate, sometimes 2-lobed stigma: fr. a small, usually black, 1-, rarely 2-seeded drupe. (After Charles Le-Forestier, French physician and naturalist; about 1800.) Syn.

Adelia Michx. About 20 species from N. Am. and the W. Indies to Brazil. —Shrubs of little ornamental value.

A. Lvs. acuminate, 3–10 cm. long.....1. *F. acuminata*
AA. Lvs. obtusish or acute, 1–4 cm. long.....2. *F. neo-mexicana*

1. **F. acuminàta** Poir. Deciduous shrub to 3 m. or small tree sometimes to 10 m.; glabrous: lvs. ovate-oblong to ovate-lanceolate, acuminate, cuneate, slightly serrate, principally above the middle, light green; petiole 5–15 mm. long: fls. greenish, minute; the staminate in dense bracted clusters, the pistillate in short panicles: fr. narrow-oblong, 1.2–1.5 cm. long, dark purple. Fl. IV–V; fr.VI–VII. S.M.854. B.B.2:728. (*Adelia a.* Michx.) Ill. and Mo. to Ga. and Tex. Intr. 1812. Zone V.

2. **F. neo-mexicàna** Gray. Deciduous shrub to 3 m., with spreading brs. sometimes spinescent: lvs. oblong-obovate to oblanceolate, 1.5–4 cm. long, narrowed into a short petiole, slightly crenulate-serrate, grayish green, glabrous: pistillate and staminate fls. in clusters; the pistillate with 2–4 usually sterile stamens; pedicels 3–4 mm. long: fr. short-ellipsoid, 4–5 mm. long. Fl. IV–V; fr.VIII. M.D.1919:72. (*F. acuminata* var. *parvifolia* Gray, *Adelia parvifolia* Cov.) Tex. to N. Mex. and Colo. Cult. 1913. Zone V.

Closely related species are: **F. pubéscens** Nutt. Brts. pubescent: lvs. elliptic to oblong-obovate, slightly serrate, pubescent; pistillate fls. stalked: fr. oblong, 6–7 mm. long; stone ribbed. (*Adelia p.* Ktze.) Ark. to Fla. and Tex. Cult. 1900. Zone V.—**F. ligustrìna** Poir. Shrub to 3 m.; brts. pubescent or glabrescent: lvs. petioled, elliptic to oblong or oblong-obovate, obtuse, cuneate, appressed-serrulate, pubescent beneath: fls. sessile or subsessile: fr. ellipsoid, 7–8 mm. long. Fl.VIII. S.H.2:f.407f-h,408d-e. (*Adelia l.* Michx., *Borya l.* Willd.) Tenn. to Ga. and Fla. Cult. 1810. Zone VI or VII.

9. **CHIONÁNTHUS** L. Fringe-tree. Deciduous trees or shrubs; winter-buds with several outer acute scales: lvs. opposite, petioled, entire: fls. dioecious or functionally dioecious, white, in loose panicles from lateral buds near the end of year-old brs.; calyx 4-cleft; corolla divided nearly to the base into 4 narrow petals; anthers 2, subsessile, or on very short filaments; style very short, with 2-lobed stigma; ovary 2-celled; cells 2-ovuled: fr. a 1-seeded oval dark blue drupe. (Greek *chion*, snow, and *anthos* flower; in reference to the abundant white fls.) Two species in N. Am. and China.

A. Lvs. generally oblong, 8–20 cm. long.....1. *C. virginica*
AA. Lvs. elliptic or ovate 4–10 cm. long.....2. *C. retusa*

1. **C. virgínica** L. Large shrub or tree to 10 m.; brts. stout, pubescent when young: lvs. narrow-elliptic to oblong or obovate-oblong, 8–20 cm. long, acute or acuminate, cuneate, dark green and lustrous above, paler and pubescent at least on the veins beneath, usually becoming glabrate; petiole 1–2.5 cm. long, pubescent; panicles 10–20 cm. long, usually with leafy bracts at base; calyx-lobes triangular; petals 1.5–3 cm. long, about 2 mm. broad, sometimes 5 or 6 in the staminate fl.; staminate fl. with sterile pistil: fr. ellipsoid, 1.5–2 cm. long, dark blue. Fl.v–VI; fr.IX. L.B.1264(c). S.S.6:t.267. G.F.7:325(h). M.G.14:412, 413(h);15:413(h). Am. For.24:157(h). Pa. to Fla. and Tex. Intr. 1736. Zone V.—Var. **marítima** Pursh. Lvs. beneath and panicles pubescent. Gt.16:t.564. (Var. *pubescens* Dipp.)—Very striking species when covered with its feathery white fls.; the staminate plant has larger panicles and large fls., but lacks the ornamental fr.; the lvs. turn bright yellow in autumn.

2. **C. retùsa** Lindl. Shrub with spreading brs. or small tree to 6 m.; young brts. pubescent: lvs. elliptic or ovate to elliptic-oblong or sometimes obovate,

3–10 cm. long, acute to obtuse or sometimes emarginate, broad-cuneate to rounded, entire, serrulate on young plants, pubescent on the veins beneath at least when young, reticulate: fls. in broad panicles 6–10 cm. long, at end of lateral leafy shoots; calyx-lobes lanceolate; petals 1.2–2 cm. long, about 3 mm. broad; staminate fl. without pistil: fr. ellipsoid, 1.2–1.5 cm. long, dark blue. Fl.VI–VII; fr.IX–X. G.C.III.47:328(h),329. G.F.7:327. B.S.1:339,t(h), 340. A.G.22:363(h). China. Intr. 1845, reintr. 1879. Zone (V).—Almost as handsome as the preceding species but blooming later.

10. **LIGÚSTRUM** L. PRIVET. Deciduous or evergreen shrubs or rarely trees; winter-buds ovoid, with about 2 outer scales: lvs. opposite, short-petioled, entire: fls. perfect, white, small, in terminal panicles, rarely from lateral leafless buds; calyx campanulate, 4-toothed: corolla salver-shaped, with usually short or sometimes elongated tube and with 4 spreading lobes; stamens 2, enclosed or exserted; style cylindric, not exceeding the stamens; ovary 2-celled; cells 2-ovuled: fr. a 1–4-seeded berry-like drupe, normally black or bluish black; endocarp in one species dehiscent. (The ancient Latin name of the privet.) About 50 species, chiefly in E. Asia and Malaysia to Australia, one in Eu. and N. Afr.—Ornamental shrubs or small trees mostly grown for their handsome foliage or for their often profusely produced white fls.

A. Corolla-tube shorter than limb or only slightly longer.
  B. Lvs. deciduous or only half-evergreen.
    C. Fls. pediceled.
      D. Brts. minutely puberulous or glabrous: lvs. glabrous: anthers not exceeding the corolla-lobes.
        E. Lvs. 3–6 cm. long, obtuse or acute ..... 1. *L. vulgare*
        EE. Lvs. 5–12 cm. long, acuminate ..... 2. *L. compactum*
      DD. Brts. densely pubescent; lvs. pubescent on midrib beneath: anthers exceeding the corolla-lobes ..... 3. *L. sinense*
    CC. Fls. sessile in long narrow spikes forming panicles; anthers exceeding the corolla-lobes. 4. *L. Quihoui*
  BB. Lvs. persistent, coriaceous: brts. and infl. glabrous (except in *L. nepalense* under No. 5).
    C. Corolla-lobes about as long as tube: lvs. 6–12 cm. long, acuminate ..... 5. *L. lucidum*
    CC. Corolla-lobes slightly shorter than tube: lvs. 4–8 cm. long, short-acuminate or obtusish. 6. *L. japonicum*
AA. Corolla-tube 2 or 3 times as long as lobes.
  B. Lvs. persistent; corolla-tube about 2 times as long as lobes.
    C. Infl. cylindric, short, leafy at base: lvs. broad-cuneate to rounded at base, 2–3 cm. long ..... 7. *L. Delavayanum*
    CC. Infl. pyramidal: lvs. usually rounded at base, 2–5.5 cm. long ..... 8. *L. Henryi*
  BB. Lvs. deciduous or half-evergreen: corolla-tube about 3 times as long as lobes.
    C. Brts. and lvs. glabrous; lvs. half-evergreen ..... 9. *L. ovalifolium*
    CC. Brts. pubescent and lvs. usually on midrib beneath.
      D. Calyx and pedicels glabrous, or pedicels slightly pubescent.
        E. Anthers exserted, equaling the lobes or slightly longer ..... 10. *L. acuminatum*
        EE. Anthers exserted about ½, not exceeding the middle of the corolla-lobes.
          F. Infl. few-fld., to 1.5 cm. long; anthers nearly included ..... 11. *L. ibota*
          FF. Infl. many-fld., to 3 cm. long.
            G. Lvs. acuminate to acute, pubescent on midrib beneath: shrub with spreading brs ..... 12. *L. acutissimum*
            GG. Lvs. obtusish to acute, finally glabrous or glabrate: shrub with upright brs ..... 13. *L. amurense*
      DD. Calyx and pedicels pubescent; anthers nearly as long as lobes: shrub with spreading brs ..... 14. *L. obtusifolium*

1. **L. vulgàre** L. COMMON P. Deciduous or half-evergreen shrub to 5 m., with slender spreading brs.; young brts. and panicles minutely puberulous: lvs. oblong-ovate to lanceolate, 3–6 cm. long, obtuse to acute, glabrous; petiole 3–10 mm. long: fls. pediceled, in rather dense panicles, 3–6 cm. long; anthers exceeding the tube, shorter than limb: fr. subglobose or ovoid, 6–8 mm. long, black, lustrous. Fl.VI–VII; fr.IX–X(–III). S.O.3:t.147(c). R.I.17: t.33(c). H.W.3:122(c). F.E.33:1273(h). Eu., N. Afr.; naturalized in E. N. Am. Cult. since ancient times. Zone IV.—Many garden forms; the most

important are:—Var. **aùreum** Jaeg. Lvs. yellow.—Var. **aureo-variegàtum** West. Lvs. blotched yellow. S.O.3:t.147,f.(c).—Var. **argenteo-variegàtum** West. Lvs. variegated with white. S.O.3:t.147,f.(c).—Var. **glaùcum** Mouillef. Lvs. bluish green with narrow white margin. G.W.2:495. (Var. *glaucum albo-variegatum* Spaeth.)—Var. **buxifòlium** Nichols. Lvs. ovate to oblong-ovate, obtuse, 1.5–2.5 cm. long, half-evergreen.—Var. **sempérvirens** Ait. Lvs. lanceolate to narrow-lanceolate, nearly evergreen. (Var. *italicum* Hayne, *L. italicum* Mill., *L. foliosum* Hort.)—Var. **chlorocarpum** Loud. Fr. greenish. —Var. **leucocárpum** Sweet. Fr. white.—Var. **xanthocárpum** G. Don. Fr. yellow.—Var. **péndulum** Carr. With pendulous brs. Orig. 1854.—Var. **pyramidàle** Spaeth. Of pyramidal habit, with upright brs.—The form distributed as "Polish Privet" is apparently not different from the typical form. The species is much used for hedges.

A closely related species or perhaps variety is **L. insulàre** Decne. Brts. more velvety-pubescent: lvs. narrow-oblong or lanceolate, 5–10 cm. long, acuminate, often pendulous, yellow-green: infl. larger; fr. larger. D.H.1:122. Intr. before 1878. Orig. uncertain.

2. **L. compáctum** Hook. f. & Thoms. Half-evergreen shrub or small tree to 10 m.; brts. and petioles glabrous or minutely puberulous: lvs. elliptic-lanceolate to lanceolate, 8–15 cm. long, acuminate, occasionally coarsely toothed, bright green and lustrous above, light green beneath, with 8–15 pairs of veins; petiole 6–15 mm. long: fls. small, in large panicles 10–16 cm. long; anthers about as long as corolla-lobes: fr. ellipsoid, 7–10 mm. long, bluish black. Fl.VI–VII; fr.X. R.H.1902:498–500. M.D.1915:t.3(l). (*L. yunnanense* L. Henry, *L. longifolium* Hort.) Himal., S. W. China. Cult. 1877. Zone VIII.

A closely related species is **L. Chenaùltii** Hickel. Deciduous; brts. with conspicuous white lenticels; winter-buds acute: lvs. lanceolate, rounded at base, to 25 cm. long. B.D.1925:51(l). S. W. China. Intr. 1908.

3. **L. sinénse** Lour. CHINESE P. Shrub to 4 m., with spreading brs., or small tree to 7 m.; brts. densely pubescent: lvs. elliptic to elliptic-oblong, 3–7 cm. long, acute to obtuse, usually broad-cuneate, dull green above, pubescent on the midrib beneath; petiole 3–6 mm. long: fls. distinctly stalked, in loose pubescent panicles 6–10 cm. long; corolla-tube shorter than lobes; stamens exceeding the lobes: fr. subglobose, about 4 mm. across. Fl.VII; fr.IX–X(–I). M.D.1915:t.1,2. S.L.245. G.C.III.66:142(h). B.S.2:28,t(h). (*L. villosum* May, *L. sinense* var. *villosum* Rehd., *L. Fortunei* Hort.) China. Intr. 1852. Zone VII.—Var. **multiflòrum** Bean. Anthers reddish brown. G.C. III.50:237(h). (*L. ovalifolium multiflorum* Paul.)—Var. **Stauntònii** Rehd. Less high and more spreading: lvs. elliptic to ovate, usually obtuse: panicles broader and looser. G.C.II.10:365. G.F.3:213. S.L.245. (*L. S.* DC., *L. chinense nanum* Carr.)—One of the most graceful and handsomest Privets when covered with its numerous large panicles.

4. **L. Quihoùi** Carr. Shrub to 2 m., with spreading, rather rigid brs.; brts. and panicles finely pubescent: lvs. elliptic to elliptic-oblong or obovate-oblong, 2–5 cm. long, obtuse, glabrous, subcoriaceous; petiole 1–3 mm. long, puberulous: fls. sessile, in small clusters forming long cylindric spikes collected into panicles 10–20 cm. long: corolla-tube as long as lobes; anthers exceeding, the lobes. Fl.VIII–IX; fr.X–XI. G.C.II.18:277;III.70:157(h). Gn.66:292(h); 89:669(h). (*L. brachystachyum* Decne.) China. Intr. 1862. Zone VII.?—A handsome and distinct Privet valuable on account of its late fls.

A closely related species is **L. Purpùsii** Hoefker. Lvs. broader, usually elliptic, thinner; panicle shorter and broader, more pyramidal; corolla-lobes less spreading. M.D.1915:t.5. China. Cult. 1904.

5. **L. lùcidum** Ait. Glossy P. Large shrub or tree to 10 m., with spreading glabrous lenticellate brs.: lvs. ovate to ovate-lanceolate, 8–12 cm. long, acuminate or acute, usually broad-cuneate, with 6–8 pairs of veins usually distinct above and beneath, veinlets beneath often impressed; petiole 1–2 cm. long: panicles 12–20 cm. long and nearly as wide; fls. subsessile; corolla-tube about as long as calyx; stamens about as long as corolla-lobes: fr. oblong, about 1 cm. long, blue-black. Fl.VIII–IX; fr.IX–X(–II). B.M.2565(c),2921(c). G.C. II.10:753. M.D.1915:t.1,4. (*L. japonicum macrophyllum* Hort., *L. magnoliaefolium* Hort., *L. sinense latifolium robustum* Hort., *L. spicatum* Hort.) China, Korea, Japan. Intr. 1794. Zone VIII.—Handsome evergreen shrub or tree; planted as street tree in warmer regions; one of the white-wax trees in China.

6. **L. japónicum** Thunb. Japanese P. Shrub to 3, rarely to 6 m.; glabrous except young brts. minutely puberulous at first, lenticellate: lvs. broad-ovate to ovate-oblong, 4–10 cm. long, obtusely short-acuminate or acute to obtusish, usually rounded at base, with reddish margin and midrib, with 4–5 pairs of indistinct veins; petiole 6–12 mm. long: panicles 6–15 cm. long, pyramidal; fls. short-stalked, corolla-tube exceeding the calyx; stamens slightly longer than lobes. Fl.VII–IX; fr.X–XI. R.B.25:84(c). S.I.1:t.82(c). B.S.2:26. G.W. 2:567. Japan, Korea. Intr. 1845. Zone VII or VIII.—Var. **variegàtum** Nichols. Lvs. margined and blotched with creamy-white.—Var. **rotundifòlium** Bl. Compact shrub to 2 m., with stiff short brs.: lvs. crowded, broad-ovate or suborbicular, 3–6 cm. long, obtuse or emarginate, dark lustrous green, thick, often curved; paniole compact, 5–10 cm. long; fls. sessile: fr. subglobose, about 5 mm. across. B.M.7519(c). G.C.III.53:265. R.H.1874:418;1888:440. (*L. coriaceum* Carr., *L. jap. coriaceum* Lav.) Intr. from Japanese gardens in 1860.—Handsome evergreen shrub.

Another evergreen species is **L. sempérvirens** Lingelsh. Glabrous shrub to 2 m.: lvs. suborbicular or broad-elliptic to ovate, 1.5–4 cm. long, obtuse or short-acuminate, lustrous, thick: infl. dense, 4–7 cm. long; fls. sessile or subsessile; tube of corolla scarcely twice as long as lobes; filaments much shorter than lobes: fr. ellipsoid, 8 mm. long; endocarp finally dehiscent with 2 valves. (*Syringa s.* Franch., *Parasyringa s.* W. W. Sm.) W. China. Intr. 1922. Zone VIII or VII?—It forms the sect. Sarcocarpion Mansfeld characterized by the dehiscent endocarp.

7. **L. Delavayànum** Hariot. Evergreen shrub to 2 m., with slender spreading brs.; brts. pubescent: lvs. ovate or elliptic, rarely oblong-obovate, 1–3 cm. long, acute, broad-cuneate to rounded at base, dark lustrous green above, glabrous except downy on midrib above; petiole 1–2 mm. long; panicle pubescent, narrow, 3–5 cm. long, leafy at base; pedicels 1–4 mm. long, glabrous or nearly so; calyx glabrous; corolla-tube 5 mm. long; anthers nearly as long as lobes, violet. Fl.VI; fr.X. R.H.1901:496. S.H.2:f.509k-l,510b. G.C.III.71: 179(h). (*L. Prattii* Koehne.) W. China. Intr. 1890. Zone VII?—Handsome low shrub with small evergreen lvs.

A related species is **L. ionándrum** Diels. Shrub to 3 m.: lvs. ovate or elliptic, 1–1.5 cm. long, on shoots to 3 cm. long, acute to obtuse: panicle dense, 1–2 cm. long, on short lateral brts.; anthers violet. J.L.49:t.5(h). S. W. China. Intr. about 1910? Zone VIII?

8. **L. Hénryi** Hemsl. Shrub to 4 m.; brts. pubescent: lvs. orbicular-ovate or ovate to ovate-lanceolate, 1.5–5 cm. long, obtusely short-acuminate, usually rounded at base, dark green and lustrous above; petiole 1–2 mm. long: panicle pubescent, pyramidal, short-stalked, 4–12 cm. long; calyx glabrous; corolla 6–7 mm. long; anthers nearly as long as corolla-lobes: fr. ovoid-oblong, 8 mm. long. Fl. VIII. B.S.2:25. S.H.2:f.509f-i,510a. C. China. Intr. 1901. Zone VIII.—Similar to the preceding species but lvs. and infl. larger.

Related species are: **L. strongylophýllum** Hemsl. Evergreen shrub or small tree: brts. minutely pubescent: lvs. suborbicular to broad-ovate, 1–2.5 cm. long, dark green, glabrous: panicle pyramidal, rather loose, 5–10 cm. long; corolla about 7 mm. long; tube about 1½ as long as lobes; anthers shorter than lobes. B.M. 8069(c). C. China. Intr. 1879. Zone VIII?—**L. Massalóngianum** Vis. Shrub to 1 m.; brts. pilose: lvs. linear-lanceolate, 3–8 cm. long, gradually narrowed at ends, glabrous: panicle 6–8 cm. long, pilose: fls. pediceled; anthers about ½ as long as corolla-lobes. G.C.II.16:149. Fedde, Rep. Sp. Nov.1:10. Himal. Intr. 1877. Zone VIII?

9. **L. ovalifòlium** Hassk. California P. Deciduous or half-evergreen upright shrub to 5 m.; brts. glabrous: lvs. elliptic-ovate to elliptic-oblong, 3–6 cm. long, acute, broad-cuneate, dark lustrous green above, yellowish green beneath, glabrous; petiole 3–4 mm. long: fls. creamy-white, rather unpleasantly scented, subsessile, in compact glabrous panicles 5–10 cm. long; corolla 8 mm. long; anthers as long as lobes: fr. subglobose, 5–7 mm. across, black. Fl.vii; fr.x–xi. S.I.1:t.84(c). F.E.33:1223(h). (*L. medium* Fr. & Sav., *L. Californicum* Hort., *L. japonicum* Hort., not Thunb.) Japan. Cult. 1847. Zone (V).—Var. **variegàtum** T. Moore. Lvs. variegated with pale yellow. (Var. *robustum variegatum* Hort., var. *aureum* Carr.)—Var. **aùreo-marginàtum** Rehd. Lvs. with broad yellow margin or almost entirely yellow. (Var. *aureum* Bean.)—Upright shrub of rather stiff habit with lustrous half-evergreen lvs.; well adapted and much used for hedges.

L. o. × *obtusifolium* = **L. ibòlium** Coe. Upright shrub; brts. puberulous: lvs. pubescent on midrib beneath: infl. puberulous; calyx glabrous; anthers about as long as corolla-lobes. Orig. about 1910. Zone V.—Useful as a hedge plant, hardier than the preceding species.

10. **L. acuminàtum** Koehne. Shrub to 2 m., with upright and spreading brs.: lvs. rhombic-ovate to ovate-lanceolate, 3–8 cm. long, acute to acuminate, cuneate, appressed-pubescent near margin above and ciliolate, pubescent on midrib beneath; petiole 2–5 mm. long, pubescent: panicle 3–6 cm. long, pubescent: fls. subsessile; corolla 9–10 cm. long; anthers exserted: fr. ovoid, 8 mm. long, lustrous blank. Fl.vi; fr. ix–x. S.T.1:t.71. M.D.1904:74. N.T. 1:280. (*L. ciliatum* Rehd., not Bl., *L. medium* Hort., not Franch. & Sav.) Japan. Intr. 1888. Zone V.—Var. **macrocárpum** Schneid. More strictly upright: lvs. larger: fr. to 12 mm. long. N.T.1:281. M.D.1904:75. (*L. m.* Koehne.) Japan. Intr. before 1900.—Upright shrub; the lvs. turning yellow in autumn and falling rather early.

11. **L. ibòta** Sieb. & Zucc., not Sieb. Shrub to 2 m., with spreading brs.; brts. slightly pubescent, the shoots usually glabrous: lvs. rhombic-ovate to elliptic-oblong, 1.5–5 cm. long, acute, cuneate, ciliolate, light green beneath and pubescent on midrib: infl. nearly capitate, 1–1.5 cm. long, 4–8-fld., slender-peduncled; corolla 8 mm. long; anthers slightly exceeding the tube: fr. globose-ovoid, 7–8 mm. long. Fl.vi; fr.ix–x. N.T.1:277. M.D.1904:73. S.H.2:f. 507n-q,508f. (*L. ciliatum* Sieb., *L. ibota* var. *ciliatum* Dipp.) Japan. Cult. 1870. Zone V.—One of the least ornamental species.

12. **L. acutíssimum** Koehne. Shrub to 3 m., with spreading brs.; brts. pubescent: lvs. elliptic- or ovate-oblong to lanceolate, 1–7 cm. long, acute or acuminate, cuneate or broad-cuneate, dark green above, light green beneath and pubescent on midrib and often sparingly on the face; petiole 1–2 mm. long: panicles narrow, nearly cylindric, 2–5 cm. long; anthers reaching the middle of the lobes: fr. globose-ovoid or ovoid, 8–9 mm. long, bluish black. Fl.vi; fr.ix–x. S.H.2:f.505m-n²,506a-d. Fedde Rep. Sp. Nov.1:8. C. China. Intr. about 1900. Zone V.—Similar to *L. obtusifolium*, but less graceful.

13. **L. amurénse** Carr. Amur P. Shrub to 5 m., with upright brs. nearly

pyramidal; brts. pubescent: lvs. elliptic to oblong, 2.5–6 cm. long, obtuse to acute, rounded or broad-cuneate at base, ciliolate, sometimes lustrous above, glabrous except pubescent on midrib beneath; petiole 2–4 mm. long, usually pubescent: panicle 3–5 cm. long, pubescent; calyx glabrous or slightly pubescent near base; corolla 7–9 mm. long; anthers slightly exserted, not reaching the middle of the lobes: fr. globose-ovoid, 6–8 mm. long, black, slightly bloomy. Fl.VI–VII; fr.IX–X. S.T.1:t.72. M.D.1904:72. R.H.1861:352. (*L. ibota* var. *a.* Hort.) N. China. Cult. 1860. Zone V.—Handsome shrub of upright habit, somewhat similar to *L. ovalifolium*; hardier.

14. **L. obtusifòlium** Sieb. & Zucc. Shrub to 3 m., with spreading or arching brs.; brts. pubescent: lvs. elliptic to oblong or oblong-obovate, 2–6 cm. long, acute or obtuse, cuneate or broad-cuneate, glabrous above, pubescent beneath or only on midrib: petiole 1–4 mm. long, pubescent; panicles nodding, 2–3.5 cm. long, usually numerous on short brts. along the brs.; calyx pubescent; corolla 8–10 mm. long; anthers nearly as long as lobes: fr. subglobose, about 6 mm. long, black, slightly bloomy. Fl.VII; fr.IX–X. S.I.1:t.83(c). G.F.6: 425. B.C.4:1861. Gn.M.29:225(h). M.G.14:218(h). (*L. ibota* Sieb.) Japan. Intr. about 1860. Zone V.—Var. **Regelìanum** Rehd. Low shrub with almost horizontally spreading brs.: lvs. usually more pubescent, oblong to obovate: panicle shorter; anthers broader. M.D.1904:70. R.H.1904:434(h),435. F.E. 20:811(h, as *L. amurense*). S.L.246(h). (*L. R.* Koehne.) Japan. Cult. 1885. Zone V.—Graceful floriferous shrub.

11. **JASMÌNUM** L. Jasmine. Deciduous or evergreen, climbing or upright shrubs, with usually green angled brs.: lvs. opposite or alternate, odd-pinnate, sometimes reduced to 1 lft.; lfts. entire: fls. usually in terminal cymes or lateral on year-old brts., perfect, regular, yellow or white, rarely pink, salver-shaped, with slender tube and 4–9 lobes convolute in bud; calyx campanulate, with 4–9 minute or subulate lobes; stamens 2, included; ovary 2-celled, each cell with 1–4 usually upright ovules: fr. a 2-lobed, usually black berry, each carpel 1–2-seeded; seed with little albumen. (The latinized Arabic name.) About 200 species chiefly in trop. and subtrop. regions; in Am. only 1 species.

A. Lvs. opposite.
  B. Fls. lateral, solitary, yellow: lfts. 3 ..... 1. *J. nudiflorum*
  BB. Fls. terminal, usually several.
    C. Lfts. reduced to 1: fls. pink ..... 2. *J. Beesianum*
    CC. Lvs. pinnate: fls. white ..... 3. *J. officinale*
AA. Lvs. alternate.
  B. Lfts. and brts. glabrous.
    C. Calyx-teeth subulate, as long or longer than calyx-tube.
      D. Infl. many-fld.; lfts. 3–5 ..... 4. *J. floridum*
      DD. Infl. 2–5-fld.: lfts. 3 ..... 5. *J. fruticans*
    CC. Calyx-teeth shorter than calyx-tube ..... 6. *J. humile*
  BB. Lfts. and brts. pubescent: calyx-teeth pilose, subulate ..... 7. *J. Giraldii*

1. **J. nudiflòrum** Lindl. Winter J. Deciduous shrub with slender upright and arching brs., to 5 m.; brts. angled, glabrous: lfts. 3, ovate to oblong-ovate, 1–3 cm. long, narrowed at ends, mucronulate, ciliolate; petiole 5–10 mm. long: fls. bright yellow, solitary and axillary along last year's brs., on stalks about 6 mm. long and covered with narrow green bracts; calyx-lobes linear, green, as long or longer than calyx-tube; corolla 2–2.5 cm. across, with usually 6 often wavy obovate lobes about half as long as tube. Fl.II–IV. B.M.4649(c). B.R.32:48(c). G.C.III.11:181. Gs.2:248(hc). S.L.235(h). Gn.89:537(h). (*J. Sieboldianum* Bl.) China. Intr. 1844. Zone VI?—Valued for its early fls.

A closely related species is **J. primulìnum** Hemsl. Primrose J. Evergreen shrub to 3 m.: lfts. elliptic-oblong to lanceolate, 2–7 cm. long: fls. sometimes on

elongated leafy brts.; corolla about 4 cm. across with 6–10 lobes, sometimes double; calyx-lobes lanceolate, much longer than calyx-tube. B.M.7981(c). R.H.1906: 472,t(c). Gn.71:270,t(c);87:195. G.C.III.33:197. W. China. Intr. 1900. Zone VIII?

2. **J. Beesiànum** Forrest & Diels. Rosy J. Slender shrub to 1 m.; brts. grooved, slightly pubescent, chiefly near the nodes: lfts. solitary, ovate-lanceolate to lanceolate, 3–5 cm. long, acuminate, slightly pubescent on both sides; petiole 1–3 mm. long: fls. 1–3, pink or deep rose, fragrant; calyx-teeth subulate, 6 mm. long; corolla about 1.5 cm. across, with broad-elliptic to suborbicular lobes about half as long as tube. Fl.v. G.C.III.77:131. W. China. Intr. about 1910. Zone VIII?—Remarkable for its pink fls. though less showy than those of most other species.

3. **J. officinàle** L. Common White J. Deciduous or half-evergreen climbing or sarmentose shrub, sometimes to 10 m.; brts. slender, angled, glabrous or nearly so: lfts. 5–7, rarely 9, elliptic-ovate to oblong-ovate, 1–6 cm. long, acute or acuminate, sessile, the terminal larger and stalked, glabrous: fls. white, fragrant, slender-pediceled in 2–10-fld. terminal cymes; calyx-teeth linear, 6–10 mm. long, corolla about 2.5 cm. across with 4–5 oblong lobes about as long as tube. Fl.vi–x. S.O.3:t.150(c). B.M.31(c). B.C.3:1718. Persia to Kashmir and China. Cult. since ancient times. Zone VII or VIII.—Var. **aureo-variegàtum** West. Lvs. blotched with yellow. F.M.6:327(c). (Var. *aureum* Hort.)—Var. **affine** Nichols. Fls. larger and calyx-lobes broader. R.H.1878:428. (*J. a.* Carr.)—Handsome shrub with fragrant white fls. in summer.

4. **J. flòridum** Bge. Half-evergreen shrub, with upright or spreading flexuose brs.; brts. angled, glabrous: lfts. usually 3, sometimes 5, elliptic-ovate to ovate-oblong, 1–3.5 cm. long, acute: fls. yellow in terminal many-fld. cymes; calyx-teeth subulate, as long as tube. Fl.vii–ix. B.M.6719(c). S.H. 2:f.527h-i,528a-c. China. Intr. 1850. Zone VIII.

5. **J. frúticans** L. Evergreen or half-evergreen shrub with slender upright or spreading weak brs., to 3 m.; brts. angled, glabrous: lfts. 3, rarely 1, obovate-oblong or oblong to spatulate, 8–20 mm. long, obtuse, cuneate, ciliolate: fls. yellow, in 2–5-fld. cymes on short lateral brts.; calyx campanulate, with subulate teeth; corolla about 1.5 cm. across, with 5 ovate obtuse lobes. Fl. vi–vii. B.M.461(c). S.O.3:t.148(c). S.H.2:f.527f-g,528k-n. S. Eu., N. Afr. Intr. about 1570. Zone VIII.

6. **J. húmile** L. Italian J. Evergreen or nearly evergreen shrub with upright and spreading brs.; brts. angled, glabrous: lfts. 3–7, rarely more, elliptic or ovate to ovate-lanceolate, 1.5–3.5 cm. long, acute or acuminate, rarely obtusish, dark green above, pale beneath, glabrous: fls. in 6–many-fld. cymes, rarely 2–5-fld.; calyx-teeth triangular, short; corolla 1.5–2 cm. across with a tube 1–1.5 cm. long. Fl.vi–vii. B.R.350(c),178(c),1409(c). S.O.3: t.149(c). B.M.1731(c). (*J. revolutum* Ker, *J. Wallichianum* Lindl., *J. Reevesii* Hort., *J. triumphans* Hort.) Afghan. to Himal. Intr. about 1650 and from the Himal. 1812. Zone VII or VIII.—A very variable species, often divided into 3 species: 1° typical *J. humile.* Low shrub with scarcely angled stems, 3-, rarely 5-foliolate lvs. and 2–4-fld. infl.; supposed to be native to S. E. Eu. —2°. *J. revolutum* with slightly angled brts., 3–7-foliolate lvs. and many-fld. infl.; from Afghan. and N. W. Himal.—3°. *J. Wallichianum* with sharply angled brts., 7–11-foliolate lvs., smaller lfts. and smaller fls. in a several-fld. infl.; from Nepal.

7. **J. Giráldii** Diels. Deciduous shrub to 2 m., with spreading brs.; brts. angled, hairy: lfts. 3, rarely 5, elliptic or ovate or oblong-ovate, 1–4 cm. long,

obtuse to acute, sparingly hairy above, glaucescent and pilose beneath, densely so on the veins; petiole 5–10 mm. long, hairy: fls. yellow, in 3–9-fld. cymes; calyx-teeth subulate, pilose, slightly shorter, rarely longer than tube; corolla 1.2–1.5 cm. across, with slightly spreading ovate lobes. Fl.v–vi. C. China. Intr. 1907. Zone VII or VIII.

A related species is **J. Párkeri** Dunn. Low shrub to 30 cm.; brts. angled, like lvs. and calyx puberulous: lfts. 3–5, ovate, 3–6 mm. long, obtuse: fls. solitary, terminal and axillary; calyx-teeth subulate, half as long as tube: corolla yellow, about 1.5 cm. across with 6 lobes half as long as tube. N. W. Himal. Intr. 1923. Zone VIII?

Fam. 97. LOGANIACEAE Lindl. LOGANIA FAMILY

Herbs, shrubs or trees: lvs. usually opposite, simple, stipulate: fls. usually perfect and regular, usually in cymes or panicles; calyx 4- or 5-lobed or -parted; corolla 4- or 5-lobed, rarely with 8–16 lobes; lobes imbricate or convolute in bud; stamens as many as corolla-lobes and usually alternate with them, rarely reduced to 1; ovary superior, 2-celled; ovules usually many; style with 2 or rarely 4 stigmas: fr. a caps., rarely a berry or drupe; seed albuminous, sometimes winged.—More than 30 genera and about 400 species, mostly trop. or subtrop., few in N. Am.

A. Habit climbing; glabrous: fls. solitary or few, yellow.....1. *Gelsemium*
AA. Habit not climbing, pubescent: fls. in panicles or heads, small.....2. *Buddleia*

GELSÈMIUM Juss. Evergreen twining glabrous shrubs; winter-buds with several pairs of pointed scales: lvs. opposite or sometimes verticillate, short-petioled, entire; stipules reduced to a stipular line: fls. axillary, 1 or few or in dense cymes, fragrant; calyx 5-parted; corolla funnelform, with 5 short imbricate lobes; style slender, 4-cleft at apex: caps. ovoid or oblong, septicidal, with flattened and winged seeds. (From *gelsomino* the Italian name of the true Jasmine.) Two species in E. N. Am. and in E. Asia.

G. sempérvirens Ait. CAROLINE YELLOW JESSAMINE. Climbing to 6 m.: lvs. lanceolate or oblong-lanceolate, rarely ovate, 2–9 cm. long, acute or acuminate, dark green and lustrous above: fls. bright yellow, 1 or few on short scaly stalks; corolla about 3 cm. long; caps. 1–1.5 cm. long, compressed. Fl.iv–vi. B.M.7851(c). E.N.IV.2:29. G.W.9:494. Va. to Fla. and Tex. and to C. Am. Intr. 1640. Zone VIII?—Used for covering porches and banks and valued for its yellow, very fragrant fls. and lustrous foliage.

2. **BŪDDLEIA** L. BUTTERFLY-BUSH. Deciduous or evergreen shrubs or trees, rarely herbs, with stellate, glandular or scaly pubescence; winter-buds acute, with usually 2 outer scales, superposed: lvs. opposite, rarely alternate, short-petioled, entire or serrate; stipules reduced to a stipular line, occasionally developed: fls. variously colored, in clusters, panicles or spikes; calyx campanulate, 4-lobed; stamens 4, included; corolla tubular or campanulate, 4-lobed; styles with a 2-lobed stigma: fr. a 2-valved septicidal caps.; calyx and usually corolla persistent; seeds numerous, minute. (After Adam Buddle, an English botanist; died 1715.) About 70 species in trop. and temp. regions of Am., Asia and S. Afr.—Ornamental shrubs, planted chiefly for their showy fls.

A. Fls. in panicles.
B. Lvs. opposite.
C. Panicles spike-like, often several at end of brs.
D. Lvs. glabrous or slightly grayish tomentose beneath: brts. sharply 4-angled or winged.
E. Racemes pendulous; corolla gray-tomentose outside.....1. *B. japonica*
EE. Racemes upright; corolla puberulous outside.....2. *B. Lindleyana*

DD. Lvs. densely tomentose beneath: brts. obscurely 4-angled or subterete.
E. Corolla glabrous or nearly so outside: tomentum thin, close.....3. *B. Davidi*
EE. Corolla tomentose outside: tomentum woolly, fluffy.....4. *B. nivea*
CC. Panicle not spike-like.
D. Lvs. nearly entire or obscurely toothed.....5. *B. officinalis*
DD. Lvs. coarsely dentate.....6. *B. paniculata*
BB. Lvs. alternate.....7. *B. alternifolia*
AA. Fls. in globose heads, yellow.....8. *B. globosa*

1. **B. japónica** Hemsl. JAPANESE B. Shrub to 2 m., with spreading 4-winged brts.: lvs. ovate- or oblong-lanceolate, 8–20 cm. long, acuminate, remotely denticulate, rarely coarsely toothed, glabrous above, grayish tomentose at first beneath, later usually glabrate: fls. pale lilac, in dense pendulous panicles 10–20 cm. long; calyx woolly, with lanceolate lobes; corolla 1.5–1.8 cm. long, slightly curved, tomentose outside, with slightly spreading short lobes: caps. ovoid, about 6 mm. long, surrounded by the persistent calyx and corolla. Fl.VI–IX; fr.VIII–IX. I.H.17:t.25(c). R.H.1870:337;1878:330. (*B. curviflora* André, not Hook. & Arn.) Japan. Intr. about 1866. Zone (V).—One of the least ornamental species.

2. **B. Lindleyàna** Fort. Upright shrub to 2 m.; brts. 4-angled and usually slightly winged: lvs. ovate to oblong-lanceolate, 5–10 cm. long, acuminate, remotely denticulate, pale green beneath and slightly puberulous or nearly glabrous: fls. purplish-violet in upright rather dense spikes 7–20 cm. long; calyx scurfy, with triangular-ovate lobes; corolla slightly curved, 1.5 cm. long, scurfy outside. Fl.VII–VIII. B.R.32:4(c). F.S.2:t.112(c). R.H.1846:201,t(c). E. China; sometimes naturalized in the S. E. States. Intr. about 1840. Zone VII or VIII.

B. L. × *japonica* = **B. intermèdia** Carr. Lvs. oblong-ovate, 8–15 cm. long. fls. violet in arching or pendulous panicles; calyx-teeth ovate-lanceolate. R.H. 1873:151,t(c). Orig. about 1870.—Var. **insígnis** Rehd. Brts. 4-winged: lvs. oblong-lanceolate, often in 3's: fls. rosy-violet in erect fairly dense spikes 10–15 cm. long. R.H.1878:330,t(c). (*B. i.* Carr., *B. japonica* var. *i.* Wils.)

3. **B. Davìdi** Franch. ORANGE-EYE B. Shrub to 5 m., with spreading brs., rarely weak and prostrate; brts. slightly angled, pubescent: lvs. ovate-lanceolate to lanceolate, 10–25 cm. long, acuminate, closely serrate or serrulate, dark green and soon glabrous above, white-tomentose beneath: fls. fragrant, in upright or nodding spikes 10–25 cm. long; calyx pubescent, with ovate lobes; corolla usually lilac, orange at the mouth; tube about 1 cm. long, glabrous or slightly pubescent outside; stamens inserted about the middle of the tube; caps. oblong, pointed, 6–8 mm. long. Fl.VII–X. B.M.7609(c). Add.2:t.45(c). R.H.1898:132,t(c). G.C.III.24:139. Gn.55:428,t(c);88:67(h). (*B. variabilis* Hemsl.) China. Cult. 1890. Zone (V).—Var. **Veitchiàna** Rehd. More robust, with dense large spikes of mauve-colored fls. with bright orange eye; the earliest to bloom. J.L.27:182. G.W.16:538. Gn.84:499. Intr. 1893.—Var. **magnífica** Rehd. & Wils. Similar to the preceding var., with larger deep rose-purple fls. in very dense spikes, with deep orange eye and the margins of the corolla-lobes reflexed. Gn.69:288,t(c). R.B.33:281,t(c). S.L.126(h). Intr. 1900.—Var. **supérba** Rehd. & Wils. Similar to the preceding, but corolla-lobes not reflexed and panicles larger. R.B.35:12,t(c). Intr. 1900.—Var. **Wilsònii** Rehd. & Wils. Tall and arching, with longer and narrower lvs. and looser drooping spikes, sometimes to 70 cm. long; corolla smaller, rose-lilac, the lobes with reflexed margin. Intr. 1900.—Var. **nanhoénsis** Rehd. Shrub to 1.5 m., with slender spreading brs.: lvs. lanceolate, up to 12 cm. long and 2–4.5 cm. broad. Kansu. Intr. 1914. (*B. variabilis* var. *n.* Chittenden.) Very handsome and valued for its late blooming season.

B. D. × *asiatica* = **B. hýbrida** Farquhar. Lvs. densely white-tomentose beneath, serrulate: spikes slender; corolla pubescent outside; in the form "Eva Dudley" pale lavender-pink with orange throat. Orig. before 1918. Probably not hardy.—*B. D.* × *globosa* = *B. Weyeriana;* see under No. 8.

A closely related species is **B. albiflòra** Hemsl. Shrub to 4 m.; brts. nearly terete, soon glabrous; lvs. lanceolate, doubly serrate: fls. usually lilac, orange-colored at throat, in spikes 20–50 cm. long; calyx slightly pubescent; corolla-tube about 6 mm.long; stamens inserted below the mouth. G.27:501. (*B. Hemsleyana* Koehne.) China. Intr. 1900. Zone (V).—Less handsome than the preceding species.

4. **B. nívea** Duthie. Upright shrub to 3 m.; brts. under side of lvs. and infl. densely covered with white fluffy tomentum becoming tawny: lvs. ovate-lanceolate, 10–25 cm. long, acuminate, nearly rounded at base, rather coarsely toothed, finally glabrous above and dark green: fls. lilac or purple in dense narrow spikes 8–15 cm. long, usually several at end of brts.: corolla tomentose outside; tube 6 mm. long; stamens inserted below the mouth; caps. oblong-ovoid, pubescent. Fl.VIII–IX. G.C.III.38:275. B.S.1:273. S.L.127(h). Gt. 73:156(h). W. China. Intr. 1901. Zone VII or VIII.—Var. **yunnanénsis** Rehd. & Wils. Tomentum less fluffy, yellowish: lvs. pubescent above: fls. larger and spikes usually solitary. W. China. Intr. 1908. Zone VIII?—Conspicuous and distinct on account of the fluffy white tomentum; the fls. less showy, almost hidden by the white wool.

A closely related species is **B. stenostâchya** Rehd. & Wils. Tomentum less fluffy: lvs. oblong-lanceolate, 12–20 cm. long, acuminate, cuneate, crenate-serrate or nearly entire: spikes usually 3 at end of brs., narrow-cylindric, 15–45 cm. long; corolla-tube 8 mm. long; stamens inserted between the middle of the tube and mouth: caps. cylindric-oblong, 8–12 mm. long. W. China. Intr. 1908. Zone VII or VIII.—Another related species is **B. asiática** Lour. Tomentum rather close: lvs. lanceolate, 10–20 cm. long, acuminate, entire or serrulate, white- or buff-tomentose beneath: fls. white, very fragrant in slender drooping panicles 8–14 cm. long; corolla villous outside; stamens above the middle of the tube. Fl.III–IV. B.M. 6323(c). G.C.III.39:106;73:49(h). Gn.84:621. S. E. China to India and Mal. Probably not hardy.—*B. a.* × *Davidii* = *B. hybrida;* see under No. 3.—*B. a.* × *officinalis* = *B. Farquhari;* see under No. 5.

5. **B. officinàlis** Maxim. Shrub to 3 m.; brts. nearly terete, gray-tomentose; lvs. oblong to linear-lanceolate, 6–14 cm. long, acuminate, entire or serrulate; grayish pubescent above, white- or fulvous-tomentose beneath: fls. fragrant, in dense peduncled cymes forming panicles 10–15 cm. long or sometimes in small short-stalked cymes on elongated spikes collected into broad loose panicles; corolla lilac with orange eye, tube 8–10 mm. long, pubescent inside and outside; stamens inserted above the middle; style short; ovary pubescent at apex. Fl.IV. B.M.8401(c). G.C.III.49:200;66:175(h). C. and W. China. Intr. 1907. Zone VIII?—Very handsome shrub with fragrant fls.

B. o. × *asiatica* = **B. Farquhárii** Farrington. Lvs. yellowish-tomentose beneath, minutely serrulate or nearly entire: fls. pale pink, in slender elongated spikes forming loose and wide panicles; lower cymes stalked. Orig. about 1914. Probably not hardy.

6. **B. paniculàta** Wall. Shrub to 5 m.; brts. with villous white or tawny tomentum: lvs. oblong-lanceolate to lanceolate, 5–12 cm. long, acuminate, truncate or subcordate to subhastate at base, coarsely toothed, pubescent above and white- or tawny-tomentose beneath: fls. fragrant, in pyramidal panicles 6–10 cm. long or sometimes longer; calyx tomentose with ovate lobes; corolla lilac with white throat; tube about 8 mm. long, pubescent outside, glabrous inside above the middle; stamens inserted above the middle; ovary tomentose; style short. Fl.VI–IX. B.M.4793(c). F.S.9:t.958(c). (*B. crispa* Benth.) Himal. and Afghan. Intr. 1879. Zone VII or VIII.

A related species is **B. Fárreri** Balf. f. & W. W. Sm. Shrub over 2 m. high; young growth white-tomentose: lvs. oblong-ovate, to 30 cm. long, cordate or

truncate at base, coarsely dentate or crenate, tomentose beneath; petiole 2.5–5 cm. long: fls. fragrant, in usually 3–5-fld. very short-stalked heads forming stiff terminal panicles to 20 cm. long; corolla rose-lilac, glabrous without, about 8 mm. long. B.M.9027(c). Gn.88:250. N. W. China. Intr. about 1918. Zone VIII?

7. **B. alternifòlia** Maxim. Shrub to 4 m. or small tree with wide spreading arching or pendulous brs.; brts. scurfy, soon glabrous: lvs. alternate, lanceolate, 3–10 cm. long, narrowed toward the acute or obtusish apex, cuneate, dull dark green above, with grayish white scurfy tomentum beneath; petiole 5–20 mm. long: fls. borne along last year's brs. in dense short-stalked clusters 1–2 cm. long, leafy at base; calyx grayish tomentose, with broad-ovate lobes: corolla bright lilac-purple; tube 8 mm. long, nearly glabrous outside; ovary glabrous: caps. oblong-ovoid, 4 mm. long. Fl.vi. B.M.9085 (c). G.C.III.78:27. Gn.87:52; 88:757. J.L.47:192,t(h). N. W. China. Intr. 1914. Zone V?—Very distinct and handsome in bloom with its long arching or pendulous brs. covered with clusters of lilac-purple fls.

8. **B. globòsa** Hope. Half-evergreen shrub to 5 m. or more; brts. and lvs. beneath yellowish-tomentose: lvs. elliptic-ovate to lanceolate, 8–20 cm. long, acuminate, cuneate, crenate, rugose and glabrous above: fls. small, fragrant, bright yellow, in dense long-peduncled axillary heads 2 cm. across forming terminal panicles 10–20 cm. long. Fl.vi. B.M.171(c). Gn.33–369. F.R.3: 335(h). (*B. capitata* Jacq.) Peru. Intr. 1774. Zone VIII?—Very distinct and striking species.

B. g. × *Davidii* = **B. Weyeriana** Weyer. Fls. grayish yellowish, grayish to violet in subglobose heads crowded into dense terminal panicles; in var. "Golden Glow" buff-colored; G.C.III.68:181;74:208. Gn.87:526, 679; in var. "Moonlight" creamy buff; Gn.87:526. Orig. about 1915.

The plants in cult. as *B. yunnanensis* (Gn.84:557) and *B. Forrestii* (Gn.85:20) are not true to name but seem closely related to *B. nivea* and *B. stenostachya*.

Fam. 98. APOCYNACEAE Lindl. DOGBANE FAMILY

Herbs, shrubs or trees, often climbing, with milky juice: lvs. opposite or verticillate, rarely alternate, entire, exstipulate, rarely with minute interpetiolar stipules or lines: fls. perfect, regular, in cymes, panicles or solitary; calyx 4–5-parted, with imbricate lobes, persistent: corolla usually with appendages in the throat, 4–5-lobed, lobes convolute in bud, rarely valvate; stamens 5, rarely 4, adnate to the tube; anthers usually sagittate and acute; pollen granular; carpels usually 2, mostly superior, distinct, rarely more or less united, usually many-ovuled, with an entire or lobed disk at base; style 1, simple or divided: fr. usually of 2 dehiscent follicles, sometimes berry-like or drupe-like; seeds usually compressed and often with a tuft of hairs; albumen usually scanty, sometimes wanting.—About 130 genera and 1100 species chiefly in trop. and subtrop. regions.

A. Fls. solitary, axillary; trailing plant ..... 1. *Vinca*
AA. Fls. in cymes: climbing shrub ..... 2. *Trachelospermum*

1. **VINCA** L. Periwinkle. Evergreen or deciduous subshrubs or herbs, trailing, the flowering shoots upright: lvs. decussate: fls. rather large, usually blue; calyx small, 5-parted, with narrow acuminate teeth; corolla salverform, the lobes twisted to the left; stamens adnate to the middle of the tube; anthers free; filaments curved and thick; connective dilated, large; disk of 2 glands; carpels with 6–8 ovules; stigma large, with 5 tufts of hairs: follicles cylindric; seeds cylindric. (The ancient Latin name of the plant.) About 5 species in Eu. and W. Asia.—Evergreen trailing subshrubs, chiefly used as ground-cover and for window-boxes.

A. Lvs. and calyx-lobes glabrous; lvs. narrowed at base.....1. *V. minor*
AA. Lvs. at base and calyx-lobes ciliate; lvs. truncate or subcordate at base.....2. *V. major*

1. **V. mínor** L. SMALL P. Flowering stems to 15 cm.: lvs. elliptic-ovate to elliptic-lanceolate, 2–4 cm. long, acutish or obtuse, lustrous dark green above; petiole 2–5 mm. long: fls. lilac-blue, about 2.5 cm. across; pedicels 1–3 cm. long; calyx-lobes lanceolate, 3 mm. long: follicles 7–8 cm. long. Fl.IV–IX. R.I.17:t.21(c). F.D.16:t.1577(c). S.E.6:t.906(c). Eu. and W. Asia. Often escaped from cult. Cult. since ancient times. Zone V.—Var. **argenteo-variegàta** West. Lvs. blotched with white.—Var. **aureo-variegata** West. Lvs. blotched with yellow.—Var. **alba** West. Fls. white.—Var. **atropurpúrea** Sweet. Fls. purple.—Var. **múltiplex** Sweet. Fls. purple, double. (Var. *purpurea plena* West.)—Var. **azûrea** Bean. Fls. sky-blue.

2. **V. màjor** L. Flowering stems to 30 cm.: lvs. ovate, 2–7 cm. long, acute or obtusish, dark lustrous green, ciliate, at least near base; petiole 8–1.2 cm. long, ciliate: fls. bright blue, 3–3.5 cm. across; pedicels 3–5 cm. long; calyx-lobes linear, about 1 cm. long: fr. 4–5 cm. long. Fl.V–IX. R.I.17:t.22,f.3(c). F.D.16:t.1576(c). S.E.6:t.905(c). S. Eu., W. Asia. Cult. 1789. Zone VII. —Var. **variegàta** Loud. Lvs. blotched and margined yellowish white. (Var. *elegantissima* Nichols.)

A closely related species is **V. diffórmis** Pourr. Quite glabrous: lvs. ovate, 2–7 cm. long, broad-cuneate to truncate: fls. 3–3.5 cm. across, pale lilac-blue, with rhombic, acute lobes. Fl.IX–XII. B.M.8506(c). Gn.84:569(h). (*V. media* Hoffmans. & Link, *V. acutiflora* Bertol.) S. W. Eu., N. Afr. Cult. 1880. Zone VIII?

2. **TRACHELOSPÉRMUM** Lem. Evergreen twining shrubs; winter-buds minute, densely pubescent: lvs. opposite, short-petioled, distinctly veined, usually with minute interpetiolar stipules: fls. white in terminal or axillary cymes; calyx small, 5-parted, with 5–10 glands or scales inside at base; corolla salverform, tube cylindric, lobes ovate to oblong, twisted to the left and overlapping to the right; disk annular, truncate or 5-lobed; stamens inserted above the middle of the tube; filaments short, anthers united and adhering to the large stigma; style filiform; carpels 2, many-ovuled: fr. of 2 terete follicles; seeds linear with long tuft of hairs. (Greek *trachelos*, neck, and *sperma*, seed; but seed without neck.) About 16 species in trop. and subtrop. E. Asia.

T. asiáticum Nakai. Climbing to 5 m. or more; brts. densely pubescent, red-brown: lvs. elliptic or ovate to elliptic-oblong, 2–5 cm. long, usually obtuse, lustrous dark green above; petiole about 5 mm. long: fls. yellowish white, fragrant, in peduncled terminal several-fld. cymes; pedicels 5–10 mm. long; buds long-acuminate; corolla 2 cm. across, tube about 8 mm. long; calyx-lobes narrow, pointed; anthers slightly exserted: follicles 12–22 cm. long, nearly parallel or spreading at acute angle. Fl.IV–VI. N.T.1:307. N.K.14:t.2. (T. *divaricatum* Kanitz, *T. crocostemon* Stapf, *Malouetia asiatica* Sieb. & Zucc. Japan, Korea. Cult. 1880. Zone VIII.

The closely related **T. jasminoïdes** Lem. has narrower lvs., pure white fls., acute in bud, included anthers, sepals reflexed at apex and spreading follicles. B.M.4737(c). China. Tender, often grown as a greenhouse plant.—Another species is **T. diffórme** Gray. Lvs. broad-obovate or ovate or elliptic to lanceolate, 4–9 cm. long, short-acuminate or acuminate, pubescent beneath or glabrous, thin: fls. yellowish, about 1 cm. across. B.B.3:23. Del. to Fla., S. Ill., Ark., Tex. and Mex. Intr. ? Zone VIII?

Fam. 99. ASCLEPIADACEAE Lindl. MILKWEED FAMILY

Herbs or shrubs, often twining, rarely trees, with milky juice: lvs. opposite, sometimes verticillate or alternate, usually entire, exstipulate: fls. perfect, regular, in terminal or axillary umbels, cymes or racemes; calyx 5-parted,

imbricate; corolla 5-lobed, with usually reflexed lobes; corona usually present, either an outgrowth of the corolla or of the stamens or of both; stamens 5, the filaments more or less united and the anthers adhering to the stigma; pollen in groups of 4 (tetrades) and granular or cohering into waxy masses (pollinia) attached to glandular appendages of the stigma: carpels 2, many-ovuled; styles 2, united into a diskoid stigma; disk absent: fr. of 2 follicles; seeds usually with a long tuft of hairs.—About 220 genera and 2000 species in trop. and subtrop. regions of both hemispheres.

A. Fls. brown-purple inside: lvs. rounded to cuneate at base: high twining shrub. 1. *Periploca*
AA. Fls. whitish: lvs. cordate: upright or slightly twining shrub. 2. *Marsdenia*

1. **PERÍPLOCA** L. Deciduous or evergreen twining shrubs, glabrous; winter-buds small, hairy, with few outer scales: lvs. opposite, entire: fls. in axillary or terminal cymes; calyx 5-lobed, glandular within; corolla rotate, 5-parted, with a 5 or 10-lobed crown at base of corolla; lobes overlapping to the right, often hairy above; stamens with very short free filaments and the anthers connected at apex and villous on back; pollen granular; style short, with a broad stigma: fr. of 2 follicles with numerous small winged seeds. (Greek *peri*, around, and *plokein*, to twine.) About 12 species from S. Eu. to trop. Afr., E. Asia and India.

A. Lvs. generally elliptic, up to 5 cm. broad. 1. *P. graeca*
AA. Lvs. generally lanceolate, up to 2.5 cm. broad. 2. *P. sepium*

1. **P. graèca** L. Silk-vine. Deciduous twining shrub to 15 m.: lvs. ovate or elliptic to oblong-lanceolate, 4–10 cm. long, acuminate, dark green and glossy above; petiole 6–12 mm. long: fls. about 2.5 cm. across, greenish yellow at the margin and outside, brown-purple inside, in loose long-peduncled 8–12-fld. cymes; corolla-lobes spreading, oblong, villous above; crown of 5 slender thread-like appendages recurved at apex: follicles cylindric, 10–12 cm. long, usually cohering at apex. Fl.VII–VIII; fr.IX–X. B.M.2289(c). B.R.803(c). L.B.1389(c). Gn.84:78. S. Eu., W. Asia. Cult. 1597. Zone VI or VII.—Handsome climber with dark green lustrous foliage remaining green until very late in autumn.

2. **P. sèpium** Bge. Similar to the preceding species; less high: lvs. lanceolate to oblong-lanceolate, 4–10 cm. long, long-acuminate; petiole 10–15 mm. long: fls. about 2 cm. across, in few-fld. cymes; corolla-lobes revolute: follicle 10–15 cm. long. Fl.VI–VII; fr.IX–X. Yabe, Icon. Fl. Manch.1:t.9(c). B.C.5: 2553. N. China. Intr. 1905. Zone V.—Slenderer than the preceding species and foliage less dense, turning yellow in autumn; hardier.

2. **MARSDÈNIA** R. Br. Twining or upright shrubs: lvs. opposite, usually broad: fls. usually small, in panicles or umbels; sepals small, usually ovate and obtuse, glandular or glandless; corolla campanulate or urceolate to rotate or salverform, the lobes overlapping to the right; corona-lobes 5, scaly, adnate to the stamens and to the gynostegium; pollen cohering into pollinia one in each anther-cell; stigma flat to rostrate: follicle thick, smooth or winged, often fleshy. (After William Marsden, author of a history of Sumatra; 1754–1836.) About 80 species in subtrop. and trop. regions.

M. erécta R. Br. Deciduous twining shrub to 8 m., or low with prostrate brs.; young brts. slightly pubescent, green, becoming light gray-brown: lvs. ovate, 3.5–8 cm. long, acuminate, cordate, bright green and glabrous above, minutely pubescent on the veins at first, later glabrous, petiole 1–4 cm. long: fls. white, fragrant, 8 mm. across, in terminal and axillary peduncled cymes

3–7 cm. across; corolla-lobes narrow-oblong, obtuse; stamens with small petaloid appendages on the back: fr. conic-oblong or spindle-shaped, 7–8 cm. long; each seed with a tuft of hairs about 2.5 cm. long. Fl.v–vii; fr.viii–ix. D.H.1:161. S.H.2:f.535e-k,536c-d. (*Cynanchum erectum* L.) S. E. Eu., W. Asia. Cult. 1597. Zone (V).—Of little ornamental merit.

Fam. 100. POLEMONIACEAE Juss. PHLOX FAMILY

Herbs, rarely shrubby: lvs. alternate or opposite, simple, pinnate or digitate, exstipulate: fls. perfect, regular or nearly so; calyx 5-cleft: corolla 5-lobed, the lobes convolute; stamens 5, inserted on the corolla-tube; ovary superior, 2–5-celled, with a disk at base; cells with many, rarely 1 ovule; style 1, 3-fid, rarely 5-fid at apex: fr. a loculicidal, rarely septicidal caps.; seed with copious albumen and a straight embryo.—About 12 genera and 270 species in Eu., Asia and Amer.

A. Stamens inserted at different heights: lvs. entire, opposite ..... 1. *Phlox*
AA. Stamens inserted at the same height: lvs. divided, alternate ..... 2. *Gilia*

1. **PHLOX** L. Phlox. Perennial or annual herbs, sometimes suffruticose: lvs. opposite or the upper ones alternate, entire: fls. in terminal cymes or panicles or solitary, bright colored; calyx tubular or campanulate, 5-ribbed or 5-cleft, lobes pointed, persistent: corolla salverform, with slender tube constricted at the throat, and with obovate or suborbicular lobes; stamens usually included, unequally placed; ovary 3-celled; style slender: caps. 3-valved, with 1 or few seeds in each cell. (Greek *phlox*, flame, originally applied to Lychnis.) About 50 species in N. Am. and 1 in Siberia.

P. subulàta L. Ground-Pink. Low tufted perennial, woody at base, forming large mats 8–15 cm. high, pubescent when young: lvs. partly fascicled, subulate, linear to linear-lanceolate, 5–15 mm. long, stiff, sharp-pointed: fls. in terminal few-fld. cymes, very numerous, about 2 cm. across, light blue to pink or rose-purple, or white; pedicels about as long as calyx; corolla-lobes entire or slightly notched. Fl.iv–v. B.M.411(c),415(c). Gn.71:166;75:29. B.B.3:57. (*P. setacea* L.—Moss-Pink.) N. Y. and Mich. to Fla.; sometimes escaped from cult. Intr. 1786. Zone V.—Very variable and many named color-forms are cult.; chiefly used as ground-cover and valued for their profuse bright-colored fls. in spring.

Other suffruticose species occasionally cult. are: **P. Douglàsii** Hook. Lvs. subulate, 5–15 mm. long, pungent, ciliate and usually glandular: fls. sessile, solitary: calyx ciliate and glandular, with subulate teeth; corolla white, 18–20 mm. long; tube longer than calyx, lobes obovate, rounded. B.B.3:59. Mont. to Wash. and n. Cal. Intr. 1920. Zone V?—**P. Hoòdii** Richards. Forming compact tufts to 8 cm. high: lvs. crowded, appressed, subulate, 4–10 mm. long, slightly pubescent and ciliate, later glabrescent: fls. terminal, solitary, sessile, white; calyx-teeth lanceolate, rigid; corolla about 1 cm. long; tube not or slightly exceeding the calyx; lobes obovate, entire. B.B.3:58. N. Dak. to Alb. and Wyo. Intr. 1921. Zone II.—**P. bífida** Beck. Diffusely branched and creeping, to 20 cm. high: lvs. flat, linear to lanceolate, 1–4.5 cm. long, minutely pubescent: fls. pale purple; pedicels longer than calyx; corolla-lobes cleft to or below the middle, the divisions linear-oblong. Fl. iv–v. B.B.3:56. Ind. to Mich., Iowa, and Mo. Intr. ? Zone V. —**P. Stellària** A. Gray. Similar to the preceding species; quite glabrous: lvs. linear to linear-lanceolate, 1.5–5.5 cm. long; fls. pale blue to nearly white; pedicels longer than calyx; corolla-lobes bifid at apex, the incision not reaching the middle. Fl.iv–v. G.F.1:257. B.C.5:2589. B.B.3:57. Ky. to S. Ill. and Tenn. Intr.? Zone V.

2. **GÍLIA** Ruiz & Pav. Herbs or subshrubs: lvs. divided or entire, alternate or opposite: fls. solitary or in panicles; calyx tubular or campanulate, teeth of equal length: corolla salver- to funnelform or campanulate; stamens inserted in tube or at the mouth; filaments naked; style glabrous, with 3 filiform

stigmas: caps. ovoid or oblong, 3-celled and 3-valved, few- to many-seeded; seeds small, not winged. (After Felipe Luis Gil, Spanish botanist; wrote on exotic plants about 1790.) Including *Leptodactylon* Hook. & Arn. More than 100 species in W. N. Am., few in S. Am.

G. pungens Benth. Suffruticose, to 30 cm. high; brts. densely puberulous: lvs. alternate, digitately 3–7-parted, with subulate pungent segments, 4–8 mm. long, with fascicles of smaller ones in the axils, puberulous or glabrate: fls. solitary; calyx glabrate, 1 cm. long, with subulate pungent teeth; corolla tubular-funnelform, 1.5–2 cm. long, yellowish, with oval lobes half as long as tube; stamen inserted at the mouth, scarcely exserted; style very short; ovary oblong. B. C. and Mont. to Calif. and Colo. Intr. 1918. Zone V.

Fam. 101. BORAGINACEAE Lindl. BORAGE FAMILY

Herbs, rarely shrubs or trees: lvs. usually alternate, usually rough-hairy, simple, usually entire, exstipulate: infl. cymose or usually scorpioid and spike-like, simple or forked: fls. perfect, usually regular: calyx 5-parted; corolla 5-lobed, with imbricate, rarely convolute lobes, rarely 4-lobed, often appendaged in the throat; stamens 5, inserted on the corolla-tube; ovary superior, of two 2-ovuled carpels, often deeply 4-lobed as if consisting of 4 1-ovuled carpels, with the style basal between the lobes: fr. usually of 4 nutlets, rarely berry-like; seed with straight or curved embryo and scant albumen.—About 85 genera and 1500 species in temp. and trop. regions.

A. Fr. a drupe: style terminal; fls. in panicles: trees or tall shrubs.....1. *Ehretia*
AA. Fr. of 4 nutlets; style basal: fls. in scorpioid spikes or solitary: low shrubs or subshrubs.
B. Stamens exserted.....2. *Moltkia*
BB. Stamens included.....3. *Lithospermum*

1. **EHRÈTIA** L. Deciduous or evergreen trees or shrubs; winter-buds subglobose, with imbricate scales: lvs. alternate, entire or serrate: fls. small, usually white, in terminal, rarely axillary panicles or corymbs; calyx small, 5-parted; corolla short-funnelform to rotate, with 5 spreading obtuse lobes imbricate in bud; stamens 5, usually exserted, with oblong or ovate anthers; filaments slender: ovary 2- or 4-celled: fr. a usually globose drupe with 4 1-celled or two 2-celled nutlets. (After G. D. Ehret, botanical painter, born in Germany about 1710; died in England 1770.) About 50 species in trop. and subtrop., few extending into temperate regions.

A. Lvs. glabrous or nearly so.....1. *E. thyrsiflora*
AA. Lvs. pubescent beneath, rough-hairy above.....2. *E. Dicksonii*

1. **E. thyrsiflòra** Nakai. Deciduous tree, to 15 m.; brts. glabrous: lvs. obovate to oblong-obovate, 5–18 cm. long, acute or short-acuminate, broad-cuneate or sometimes rounded at base, serrate, glabrous except axillary tufts of hairs beneath; petiole 1–2.5 cm. long: fls. white, subsessile, in panicles 8–20 cm. long; sepals rounded, ciliolate; corolla rotate, about 6 mm. across, with oblong lobes longer than tube; stamens about as long as corolla-lobes: fr. globose, 4 mm. across, first orange, later brownish black. Fl. VI–VII; fr. VIII. N.K.14:t.4. N.T.1:327. S.L.192(h). (*E. acuminata* Hemsl., not R. Br., *E. serrata* Fr. & Sav., not Roxb.) China, Japan, Korea, Formosa. Intr. 1900. Zone V.—Large-leaved small tree with upright brs. and large panicles of white fls. interesting as the only hardy arborescent representative of the family; hardy as far north as Mass.

2. **E. Dicksòni** Hance. Deciduous tree to 10 m.; brts. slightly pubescent at first: lvs. broad-elliptic, to elliptic, 8–20 cm. long, short-acuminate, rounded at base to subcordate or broad-cuneate, serrate, rough-pubescent above, more or less densely pubescent beneath, rarely glabrescent; petiole 1–3 cm.

long: fls. white, fragrant, subsessile, in corymbose panicles 5–10 cm. long and nearly as broad; calyx pubescent, with ovate to ovate-oblong ciliate lobes; corolla about 1 cm. across, with short-funnelform tube as long or longer than lobes: fr. subglobose, beaked, 1–1.5 cm. across, yellowish. Fl.v–vi; fr.ix. R.H.1914:174(h),175. M.O.362. (*E. macrophylla* Hemsl., not Wall.) China, Formosa, Liukiu Isls. Intr. 1897. Zone VII, or VIII.—Handsome large-leaved tree.

2. **MÓLTKIA** Lehm. Herbs or half-evergreen subshrubs: lvs. alternate, narrow, entire: fls. purple, blue or yellow in dense scorpioid terminal infl., calyx 5-cleft, with linear lobes; corolla tubular-funnelform, sometimes pubescent in the throat, with 5 upright lobes; stamens with slender filaments, exserted; anthers linear-oblong, often curved; style filiform, with small stigma: nutlets often only 1 or 2, oblique or curved, smooth or rugose. (After Count Joachin Gadske Moltke of Denmark; died 1818.) Six species in Mediterr. region to Himal.

M. petraèa Griseb. Upright subshrub, to 30 cm. tall, stems densely grayish strigose: lvs. sessile, linear to oblanceolate, 1–3 cm. long, recurved at margin, appressed-pubescent on both sides: fls. pinkish purple at first, becoming violet-blue, in forked scorpioid cymes 2–3 cm. long and about as wide: corolla tubular, 8 mm. long, with 5 short rounded lobes; stamens exceeding the corolla-lobes: nutlets smooth. Fl.vi. B.M.5492(c). B.R.29:26(c). Gn.89: 140(h). (*Lithospermum petraeum* A. DC.) S. E. Eu. Intr. 1840. Zone VI or VII?—Attractive little subshrub; adapted for a sunny place in the rockery.

Closely related species are: **M. coerùlea** Lehm. Stems erect, rigid: lvs. oblong-spatulate, obtuse, those of the stem linear-lanceolate, acutish, canescent: fls. blue; calyx-lobes linear-lanceolate; stamens exserted: nutlets rugose. Lehmann, Icon. Asperifol.t.43. Asia Minor. Intr. 1829.—**M. suffruticòsa** Brand. Subshrub with ascending stems, to 50 cm. high: lvs. linear, 5–12, on flowering brs. 2–6 cm. long, revolute, appressed-pubescent above, white-tomentose beneath, setulose on midrib: fls. purple-blue, pink in bud; stamens not exceeding the corolla-lobes: nutlets rugose. R.I.18:t.114,f.2(c). G.C.III.47:213(h). Gn.65:147(h). (*Lithospermum suffruticosum* Kern., *L. graminifolium* Viv.) Italy. Cult. 1895.

3. **LITHOSPÉRMUM** L. Herbs or subshrubs, hairy: lvs. alternate, entire: fls. white, yellow, or violet, in scorpioid leafy infl. or the lower ones axillary: calyx 5-parted; corolla funnelform or salver-shaped, with 5 spreading lobes, tube cylindric, appendaged in throat; stamens included, on usually short filaments; style with 2 stigmas; nutlets upright, straight, smooth or rugose. (Greek *lithos*, stone, and *sperma*, seed; referring to the shape of the nutlets.) About 50 species in the temp. regions of both hemispheres.

L. diffùsum Lag. Evergreen prostrate subshrub 15 to 30 cm. high; stems strigose and hirsute: lvs. sessile, linear-oblong to lanceolate, 1–2 cm. long, obtuse, appressed-setose on both sides, slightly revolute: fls. deep blue, faintly striped reddish violet, purple in bud; sessile in the axils of leafy bracts: corolla 1.5 cm. long, with broad rounded lobes and cylindric tube about 3 times as long as calyx, pubescent outside, villous in throat; stamens inserted above the middle. Fl.v–vi. M.B.G.1:t.13,f.2(c). G.C.III.30:238(h). Gn.88:41(h). (*L. prostratum* Lois., *L. fruticosum* Brot., not L.) S. Eu. Intr. 1825. Zone VII or VIII?—Handsome plant for rockeries, forming large mats; calciphobe according to Correvon, while *L. fruticosum* is calciphile.

Closely related species are: **L. oleifòlium** Lapeyr. Prostrate shrub: lvs. elliptic-oblong, 1–1.5 cm. long, whitish tomentose beneath: corolla 1.5–1.8 cm. long, glabrous inside; stamens inserted on throat. B.M.8994(c). Pyrenees. Intr. about

1900. Zone VIII?—**L. fruticòsum** L. Upright, to 50 cm.: lvs. narrow, strongly revolute, white-tomentose beneath except strigose midrib, pubescent above: corolla glabrous outside and glabrous in throat, tube about twice as long as calyx; stamens inserted near middle of tube. R.I.18:t.114,f.1(c). S. Eu. Intr. 1683. Zone VIII?

Fam. 102. VERBENACEAE Juss. VERVAIN FAMILY

Herbs, shrubs or trees: lvs. opposite, rarely whorled and very rarely alternate, simple or compound, exstipulate: fls. perfect, usually oblique or 2-lipped, rarely regular, usually in cymes or panicles; calyx 4–5-, rarely 6–8-toothed; corolla 4–5-lobed, with imbricate lobes; stamens 4, didynamous, sometimes equal, rarely 5 or 2, adnate to the corolla; disk usually small: ovary superior, of 2, 4 or 5 carpels, entire or 2–4-lobed, 2–5-celled, with 2 ovules in each cell or 5–10-celled by false partitions and cells 1-ovuled; style slender: fr. a drupe or berry, often separating into drupelets; seed with straight embryo and with or usually without albumen.—About 70 genera and 750 species chiefly in trop. and subtrop. regions of both hemispheres.

A. Stamens included; corolla 5-lobed: fls. in racemes: lvs. 8–20 mm. long.....1. *Baillonia*
AA. Stamens exserted: fls. in cymes: lvs. larger.
B. Corolla regular, 4-lobed, with short tube; stamens equal.....2. *Callicarpa*
BB. Corolla oblique; tube usually long; stamens didynamous.
C. Lvs. compound.....3. *Vitex*
CC. Lvs. simple.
D. Fr. drupe-like: fls. white to red: lvs. 8–20 cm. long.....4. *Clerodendron*
DD. Fr. a caps.: fls. blue: lvs. 2–8 cm. long.....5. *Caryopteris*

1. **BAILLÒNIA** Bocq. Deciduous shrubs: lvs. opposite or whorled, sessile, entire or sparingly toothed; fls. in terminal or axillary short racemes: calyx campanulate or short-tubular, with 4–5 short teeth; corolla slightly 2-lipped, with cylindric straight or curved tube, 5-lobed; stamens 4, didynamous, included or slightly exserted, with a small staminode; ovary 2-celled, 2-ovuled; style included or slightly exserted: fr. a drupe inclosed in the persistent calyx, with 2 1-seeded stones; seeds without albumen. (After H. Baillon, French botanist; 1827–1895.) Syn. *Diostea* Miers. Two species in S. Am.

B. júncea Briq. Shrub or small tree to 6 m., with slender rushlike brs.: lvs. in distant pairs, small, ovate-oblong, with few coarse teeth, slightly downy: fls. pale lilac, in dense spikes 2–3 cm. long, terminal on short lateral brts.; calyx cylindric, puberulous; corolla about 8 mm. long, with 5 short rounded lobes. Fl.VI. B.M.7695(c). B.S.1:495. (*Diostea j.* Miers, *Verbena j.* Hook.) Andes of Chile and Peru. Intr. 1890. Zone VIII?—Distinct and interesting shrub, resembling *Spartium junceum* in habit.

2. **CALLICÁRPA** L. Deciduous or evergreen shrubs or trees, often with stellate or scurfy pubescence; winter-buds naked, superposed: lvs. opposite, usually serrate: fls. small, in axillary cymes; calyx short-campanulate, truncate or slightly 4-toothed, rarely 4-parted; corolla with short tube, 4-lobed; stamens 4, of equal length, exserted: ovary 4-celled, 4-ovuled; style slender; with simple small stigma: fr. a subglobose, small berry-like drupe, with 2–4 stones. (Greek *kallos*, beauty, and *karpos*, fruit.) About 40 species, chiefly in the trop. and subtrop. regions of E. Asia, Mal., Australia and N. and C. Am. —Ornamental shrubs chiefly grown for the attractive fls. and handsome frs. late in autumn; rather tender, but even if killed back, the young shoots usually flower and fruit the same season.

A. Lvs. glabrous or sparingly pubescent beneath, glandular-dotted.
B. Peduncles longer than petioles: lvs. nearly glabrous.
C. Lvs. 3–8 cm. long, crenate-serrate above the middle.....1. *C. dichotoma*
CC. Lvs. 6–12 cm. long, serrulate from near the base.....2. *C. japonica*
BB. Peduncles as long or shorter than petioles: lvs. usually sparingly stellate-pubescent beneath.....3. *C. Giraldiana*
AA. Lvs. tomentose beneath: infl. subsessile.....4. *C. americana*

1. **C. dichótoma** Raeusch. Upright shrub to 1.5 m.; brts. scurfy-pubescent: lvs. elliptic or obovate, 3–8 cm. long, acuminate, cuneate, coarsely serrate except toward the base and at the apex, glandular beneath and light green; petiole 2–4 mm. long: cymes few- to many-fld., 1.2–2 cm. broad, on slender peduncles 5–12 mm. long; fls. pink, with the stamens 5 mm. long: fr. lilac-violet, 3–4 mm. across. Fl.VIII; fr.X–XI. Gn.23:540,t(c). N.K.14:t.5. S.H. 2.f.382k-l,385m. (*C. purpurea* Juss., *C. gracilis* Sieb. & Zucc.) E. and C. China, Korea, cult. in Japan; rarely escaped in the E. States. Intr. 1857. Zone (V).

2. **C. japónica** Thunb. Shrub to 1.5 m.; brts. tomentulose at first, soon glabrous: lvs. elliptic to ovate-lanceolate, 6–12 cm. long, long-acuminate, cuneate, serrulate, glandular beneath; petiole 2–5 mm. long: cymes many-fld., 1.5–3 cm. across, on peduncles 5–10 mm. long: fls. pink or whitish, with the stamens about 6 mm. long; style nearly glabrous; anthers opening by a pore at apex: fr. violet, 4 mm. across. Fl.VIII; fr.X–XI. Add. 3:t.103(c). S.I.1:t. 70(c). H.F.1861:12,t(c). G.C.1871:173. B.C.2:628. Japan. Intr. about 1845. Zone (V).—Var. **leucocárpa** Sieb. Fr. white. Jaarb. Maatsch. Anmoed. Tuinb.1845:t.5(c). Intr. about 1845.—Var. **angustàta** Rehd. Lvs. oblong-lanceolate to oblanceolate, 5–12 cm. long and 1.2–3.5 cm. broad. C. China. Intr. 1907. (V).

3. **C. Giraldiàna** Hesse. Shrub to 3 m.; brts. scurfy-pubescent or glabrescent: lvs. broad-elliptic to elliptic-ovate to oblong-lanceolate, 5–10 cm. long, acuminate, broad-cuneate, denticulate or dentate, sparingly stellate-pubescent and glandular beneath: petiole 5–10 mm. long: cymes dense, 2–3 cm. across, on pubescent peduncles about half as long or as long as petioles: fls. pink, with the stamens 7 mm. long; filaments longer than corolla-lobes; anthers oval: fr. violet, 3–4 mm. across. Fl.VII–IX; fr.IX–X. B.M.8682(c). M.D.1912:366. R.H.1923:391,t(c). G.W.29:51. China. Cult.1900. Zone (V).

4. **C. americàna** L. Shrub to 2 m.; brts. tomentose: lvs. elliptic-ovate to ovate-oblong, 7–14 cm. long, acuminate, cuneate, crenate-serrate, pubescent above, tomentose and glandular beneath; petiole 1–3 cm. long: cymes short-stalked or nearly sessile, shorter than petiole, dense; calyx obscurely toothed; corolla bluish, glabrous outside; filaments exceeding the corolla-lobes: fr. violet, 4 mm. across. Fl.V–VII; fr.X. B.B.3:99. Gr.M.690. Va. to Tex. and W. Ind. Intr. 1724. Zone VIII.—Var. **alba** Rehd. Fr. white.

A related species is **C. mollis** Sieb. & Zucc. Lvs. elliptic to oblong-lanceolate, tomentose beneath; petiole 5–8 mm. long, peduncle about as long; calyx deeply lobed; corolla glandular outside; stamens not exceeding the lobes: fr. dull purple. N.T.1:338. Japan. Cult. 1870. Zone VIII?

3. **VÌTEX** L. Deciduous or evergreen shrubs or trees; winter-buds with indistinct scales, superposed: lvs. opposite, digitate, rarely reduced to 1 lft.: fls. small, white, blue or yellowish in often panicled cymes; calyx campanulate, often 5-toothed; corolla tubular-funnelform, with 5-lobed oblique or slightly 2-lipped limb; stamens 4, didynamous, usually exserted; ovary 4-celled, 4-ovuled; style bifid at apex: fr. a small drupe with a 4-celled stone surrounded by the persistent calyx; seed without albumen. (Ancient Latin name of *V. agnus-castus*.) About 60 species in trop. and subtrop. regions of both hemispheres, few in temp. regions.

A. Infl. a dense spike: lfts. 5–7, entire or serrate . . . . . 1. *V. agnus-castus*
AA. Infl. a loose wide panicle: lfts. 3–5, usually incised-serrate to pinnatifid . . . 2. *V. Negundo*

1. **V. agnus-castus** L. CHASTE-TREE. Shrub to 3 m.; grayish tomentose and of aromatic pungent odor; brts. 4-angled: lfts. 5–7, short-stalked, lanceo-

late or narrow-lanceolate, 5–10 cm. long, entire or with few coarse teeth, grayish tomentose beneath; petiole 1.5–5 cm. long: fls. lilac or pale violet, fragrant, in dense usually sessile clusters forming dense, often panicled spikes 10–18 cm. long; calyx-teeth triangular, very short; corolla about 8 mm. long, pubescent outside and in throat; stamens and style about as long as lobes: fr. globose 3–4 mm. across, of pungent flavor. Fl.VI–IX. Add. 1:t.18(c). G.C.III.51:52(h). Gn.83:587. M.M.2:44. (*Angus-castus vulgaris* Carr.—Hemp-tree, Monks' Pepper-tree.) S. Eu., W. Asia. Intr. 1570. Zone (VI) or VII.—Var. **alba** West. Fl. white. (*V. albiflora* Hort.)—Valued chiefly for its late appearing fls.; even if killed back to near the ground, the young shoots flower the same season.

2. **V. Negúndo** L. Shrub or small tree to 5 m.; brts. 4-angled: lfts. usually 5, sometimes 3, stalked, elliptic-ovate to lanceolate, 3–10 cm. long, entire or serrate, grayish tomentulose beneath; petiole 1.5–5 cm. long: fls. lilac or lavender, in rather loose clusters, at least the lower ones stalked, forming slender spikes collected into terminal panicles 12–20 cm. long; corolla 5–6 mm. long; style and stamens shorter than lobes: fr. about 2 mm. across. H.T.5: t.199. China, India. Intr. about 1697. Probably not hardy within our area. —Var. **incîsa** Clarke. Lfts. incisely serrate or nearly pinnatifid, 2–8 cm. long, in extreme forms deeply pinnatifid with narrow remote segments (var. *multifida* Rehd.). Fl.VII–VIII. B.M.364(c). B.C.6:3481. N.K.14:t.12. N. China, Mong., Korea. (*V. i.* Bge., *V. chinensis* Mill.) Intr. about 1750. Zone (V).—Graceful shrub of loose open habit, but less showy in bloom than the preceding species.

4. **CLERODÉNDRON** L. Deciduous or evergreen trees or shrubs, often climbing; winter-buds conical, superposed: lvs. opposite or verticillate, entire or toothed, sometimes lobed: fls. in usual terminal cymes or panicles; calyx campanulate, rarely tubular, 5-toothed or 5-lobed, persistent; corolla-tube usually slender, cylindric, the limb spreading, with 5 nearly equal or unequal lobes; stamens 4, inserted on the corolla-tube, long-exserted and curved; style exserted, 2-cleft at apex: ovary incompletely 4-celled, 4-ovuled: fr. a globose or obovoid drupe often enclosed in the calyx, with juicy exocarp, the stone splitting into 4 or 2 parts. (Greek *kleros*, chance, fortune, and *dendron* tree; in reference to 2 species in Ceylon called by early botanists *arbor fortunata* and *arbor infortunata*.) About 100 species in trop. and subtrop. regions.

C. trichôtomum Thunb. Upright shrub or small tree to 8 m.; young brts. puberulous: lvs. ovate to elliptic, 10–20 cm. long, acuminate, broad-cuneate to truncate, entire or sometimes remotely toothed, pubescent beneath; petiole 3–10 cm. long, pubescent: fls. fragrant, in long-stalked cymes in the axils of the upper lvs., forming a loose terminal infl. 12–24 cm. across; calyx reddish, deeply 5-parted with ovate to ovate-oblong acute lobes; corolla about 3 cm. across, with 5 oblong lobes; stamens and style much exserted: fr. blue, 6–8 mm. across, subtended by the spreading crimson calyx. Fl.VIII–IX; fr.IX–X. B.M.6561(c). Add.1:t.15(c). Gn.75:67(h),447. F.E.29:653(h). Gs.4:27(h). (*C. serotinum* Carr., *Volkameria japonica* Hort., not Thunb.) E. China, Japan. Cult. 1880. Zone VII or VI?—Var. **Fargèsii** Rehd. Brts. glabrous or glabrescent: lvs. smaller, glabrous or nearly so; calyx-lobes narrower, green. R.H.1911:522, 523;1923:390,t(c). M.O.371. S.L.153(h). (*C. F.* Dode.) China. Intr. 1898. Zone (V).—Large-leaved, rather coarse shrub valued for its late fls. and conspicuously colored frs.

Scarcely hardy within our area is **C. foètidum** Bge. Shrub to 2 m.: lvs. broad-ovate, 10–20 cm. long, cordate, pubescent beneath, of fetid odor when bruised: fls. rosy-red, fragrant, in dense capitate cymes 10–15 cm. across. B.M.4880(c). Gn. 77:560;84:524. (*C. fragrans* var. *f.* Bakhuizen, *C. Bungei* Stend.) China. Intr. 1844. —When killed to the ground, the young shoots bloom in autumn of the same season.

5. CARYÓPTERIS Bge. Deciduous small shrubs, subshrubs or herbs: lvs. opposite, short-petioled, serrate to entire: fls. in axillary cymes; calyx campanulate, deeply 5-lobed, with lanceolate teeth, spreading and somewhat enlarged in fr.: corolla with short tube and 5 lobes, one larger and fringed; stamens 4 didynamous, exserted, style slender, 2-cleft at apex: fr. dry, separating into 4 slightly winged nutlets. (Greek *karyon*, nut, and *pteryx* or *pteron*, wing.) About 6 species in E. Asia.

C. incàna Miq. BLUE-BEARD. Shrub to 2.5 m.; brts., infl. and lvs. beneath grayish tomentose: lvs. ovate to oblong-ovate, 3–8 cm. long, acute or obtusish, broad-cuneate, coarsely serrate, dull green and pubescent above; petiole 5–20 mm. long: fls. violet-blue (rarely white), in dense peduncled cymes, in the axils of the upper lvs.; corolla 6–8 mm. long, pubescent outside. Fl.IX–X. B.M.6799(c). B.R.32:2(c). R.H.1892:324,t(c). G.C.III.42:409. Gn.81:477. (*C. Mastacanthus* Schau., *C. sinensis* Dipp.) E. China, Japan. Intr. 1844. Zone VIII.—Valued for its late fls.

Related species are: **C. tangùtica** Maxim. Shrub to 1.5 m.: lvs. ovate, 1.5–4 cm. long, with few coarse rounded teeth, gray-tomentose beneath; corolla violet-blue, about 1 cm. long, deeply 2-lipped. N. W. China. Intr. 1915. Zone ?—**C. mongòlica** Bge. Lvs. linear-lanceolate, 1.5–5 cm. long, entire, rarely with few small teeth: cyme with fewer but larger fls.; corolla 12 mm. long. H.U.7:40,t(c). R.H.1872:450,t(c). N. China, Mong. Intr. before 1846. Zone V or VI.—*C. divaricata* Maxim. is an herbaceous plant.

Fam. 103. LABIATAE Juss. MINT FAMILY

Herbs or shrubs, usually containing a volatile oil; stems usually 4-angled: lvs. opposite or whorled: fls. perfect, rarely unisexual, irregular and usually 2-lipped, rarely regular; calyx 5-toothed or 5-cleft, regular or 2-lipped; corolla 5-lobed, rarely 4-lobed, usually 2-lipped, one lip sometimes obsolete, the lobes imbricate; stamens 4, didynamous, or only 2, adnate to the corolla; ovary superior, usually with a well developed disk at base, of 2 carpels, 4-celled and deeply 4-lobed, the cells 1-ovuled; style slender, with 2 stigmas, basal or nearly so: fr. of 4 1-seeded nutlets, rarely with fleshy exocarp; seed without or scant albumen.—About 160 genera and 3000 species, distributed over the whole earth and especially abundant in the Mediterr. region and W. Asia.

A. Upper lip deeply 2-cleft, therefore corolla apparently 1-lipped; stamens exserted from between the lobes of the upper lip ..... 1. *Teucrium*
AA. Upper lip undivided or slightly lobed.
B. Perfect stamens 2; calyx 2-lipped.
C. Lvs. entire, with revolute margin, persistent ..... 2. *Rosmarinus*
CC. Lvs. crenate or serrate, deciduous.
D. Anther-cells widely separated on a long connective, articulated with the filament: infl. a spike ..... 4. *Salvia*
DD. Anther-cells contiguous, pendulous: infl. a large panicle; upper lip 4-lobed. 5. *Perowskia*
BB. Perfect stamens 4.
C. Lvs. entire.
D. Fls. in cylindric long-peduncled spikes: lvs. to 5 cm. long; calyx slightly 2-lipped. 3. *Lavandula*
DD. Fls. in whorls at least partly in the axils of foliage lvs.
E. Calyx regularly or nearly regularly 5-toothed: fls. in elongated terminal spikes or panicles.
F. Stamens not or scarcely exserted ..... 6. *Saturja*
FF. Stamens strongly exserted ..... 7. *Hyssopus*
EE. Calyx 2-lipped: fls. in axillary whorls or in heads or short spikes ..... 8. *Thymus*
CC. Lvs. serrate: fls. in dense spikes ..... 9. *Elsholtzia*

1. **TEÙCRIUM** L. Germander. Herbs, subshrubs or shrubs: lvs. opposite, entire, dentate or incised, floral lvs. similar or reduced to bracts: fls. in 2- to many-fld. whorls forming spikes or terminal heads; calyx tubular or campanulate, rarely inflated, 10-nerved, with 5 subequal lobes or the posterior one larger; corolla-tube usually included, limb apparently 1-lipped, the upper lip being small and deeply cleft, the 4 stamens exserted between its lobes; style not basal: nutlets obovoid, rugose and reticulate, centrally attached below with oblique base. (Ancient Greek name of an herb, possibly of this genus.) About 160 species in the warmer and temp. regions of both hemispheres.—Summer-blooming calciphile subshrubs, not often planted; the shrubby species like *T. creticum* L., *T. Marum* L. and *T. fruticans* L. not hardy within our area.

A. Lvs. entire: fls. in heads, yellow.....1. *T. montanum*
AA. Lvs. crenate-serrate: fls. in racemes.....2. *T. Chamaedrys*

1. **T. montànum** L. Subshrub with prostrate stems and tomentose ascending brs., to 30 cm.: lvs. narrow-oblong to linear-lanceolate, 8–20 mm. long, acutish, cuneate, revolute, pubescent above, gray-tomentose beneath. floral whorls few, crowded into a hemispherical head; corolla 1.2 cm. long, the tube scarcely longer than the calyx. Fl.VII–VIII. R.I.18:t.37f.1–3(c). F.D.18:t.1878(c). C. and S. Eu., W. Asia. Intr. 1711. Zone V.

2. **T. Chamaèdrys** L. Procumbent and ascending subshrub to 25 cm.; brts. villous: lvs. ovate to oblong-ovate, 5–25 mm. long, acute, broad-cuneate, crenate-serrate, floral lvs. entire, green on both sides, pubescent: fls. purple or rose, usually in whorls of 4 forming a loose terminal secund spike; calyx and bracts usually red-brown; corolla nearly 1.5 cm. long, the tube exceeding the calyx. Fl.VII–IX. R.I.18:t.38,f.4(c). F.D.18:t.1875(c). C. and S. Eu., W. Asia. Cult. 1750. Zone V.

A related species is **T. flàvum** L. To 50 cm. high, with ascending brs.: lvs. ovate, crenate-serrate, velutinous: fls. yellow, 1.8 cm. long in whorls of 4–6 forming spikes. S. Eu. Intr. 1640. Zone VIII?

2. **ROSMARÌNUS** L. Rosemary. Evergreen aromatic shrub: lvs. opposite, sessile, narrow, entire: fls. subsessile, in short axillary racemes; calyx campanulate, 2-lipped, the upper lip minutely 3-toothed, the lower 2-toothed: corolla with the upper lip emarginate or 2-lobed, the lower lip 3-lobed with the middle lobe large, concave, declined; stamens 2 and 2 minute staminodes; style not basal: nutlets smooth, globose-ovoid, with an oblique base. (*Ros marinus*, sea dew, the ancient Latin name of the plant.) One Mediterranean species.

R. officinālis L. Upright shrub to 2 m.; young brts. pubescent: lvs. linear, 1.5–2.5 cm. long, revolute, lustrous dark green above, white-tomentose beneath, thick: fls. violet-blue, rarely white, about 1 cm. long. Fl.IV–V. R.I.18:t.43(c). F.D.18:t.1784(c). B.S.2:449. Gn.74:620(h);89:458(h). S. Eu., Asia Minor. Cult. since centuries. Zone VIII?

3. **LAVÁNDULA** L. Lavender. Perennial herbs, subshrubs or shrubs: lvs. opposite, entire, toothed or dissected: fls. blue, violet or lilac, in 2–10-fld. whorls forming stalked cylindric spikes with often imbricate bracts, sometimes branched at base; calyx tubular, 13–15-nerved, 5-toothed; corolla tubular, with short, 2-lipped limb, upper lip 2-, lower 3-lobed; stamens 4, included, declined; style basal, nutlets smooth. (Latin *lavare*, to wash; referring to its use in the bath.) About 20 species chiefly Mediterranean, from the Canary Isls. to India.

L. spìca L. Subshrub to 1 m.; brts. tomentulose: lvs. linear to lanceolate, 3–5 cm. long, obtuse, revolute, white-tomentose, finally usually glabrate: fls. lavender, 8–10 mm. long, in spikes 3–6 cm. long borne on peduncles 5–15 cm. long. Fl.VII–VIII. R.I.18:t.26,f.1(c). F.D.18:t.1772(c). (*L. officinalis* Chaix, *L. vera* DC., *L. angustifolia* Mnch.) S. Eu., N. Afr. Cult. since centuries. Zone V.—Var. **alba** Sweet. Fls. white.

A closely related species is **L. latifòlia** L. Lvs. broader and flat; floral bracts linear, herbaceous. R.I.18:t.26,f.2(c). (*L. spica* DC., *L. spica* var. *l.* L. f.) H.A. t.38(c). S. Eu. Cult. 1568. Zone VI or V?

4. **SÁLVIA** L. SAGE. Herbs, subshrubs or shrubs: lvs. opposite, entire, toothed or pinnatisect: fls. variously colored, in 2–many-fld. whorls forming racemes, spikes or panicles, rarely solitary; calyx usually 2-lipped, the upper lip entire or 3-toothed, the lower 2-toothed; corolla usually 2-lipped, upper lip entire or emarginate, concave; stamens 2, inserted on the throat of the corolla; anther-cells widely separated on a long and slender connective articulate with the filament, the upper end of the connective bearing a perfect anther-cell, the lower end an imperfect one or none: nutlets triangular-ovoid, smooth. (Ancient Latin name of *S. officinalis*, from *salvere*, to be well; referring to the medicinal properties of the plant.) About 500 species in the temp. and warmer regions of both hemispheres. Many of them highly ornamental plants with showy fls., but the following chiefly grown as a pot-herb.

S. officinàlis L. GARDEN S. Upright aromatic subshrub, to 50 cm.; young brts. grayish tomentulose, 4-angled: lvs. oblong, 3–5 cm. long, obtuse to acute, crenulate, rugose above, grayish tomentulose beneath; petiole 1–4 cm. long: fls. bluish purple in many-fld. whorls forming an interrupted spike: calyx campanulate, the lower lip longer than the upper one: corolla about 1.5 cm. long, pubescent outside; tube with a hairy ring inside. Fl.VI–VII. R.I.18:t.44(c). F.D.18:t.1785(c). S. Eu.. Cult. since ancient times, chiefly for its medicinal properties. Zone V.—Var. **albiflòra** Alef. Fls. white: lvs. larger.—Var. **rubriflòra** Alef. Fls. red. (Var. *purpurea* Bean.)—Var. **variegàta** Sweet. Lvs. variegated.

5. **PERÓWSKIA** Karel. Herbs or subshrubs: lvs. opposite, serrate or pinnatifid: fls. in distant whorls forming terminal spikes; calyx 2-lipped, tubular-campanulate, upper lip 3-toothed or entire, lower lip 2-toothed; corolla with short funnelform tube, upper lip 4-lobed, lower lip undivided, deflexed: fertile stamens 2, exserted, with 2 pendulous, distinct, but contiguous anther-cells; staminodes 2, small: nutlets oblong-ovoid, smooth. (After P. A. Perovski, about 1840 governor of the Russian prov. Orenburg.) Four species from W. Asia to the Himal. and W. Tibet.

P. atriplicifòlia Benth. Upright subshrub to 1.5 m., of aromatic sage-like odor when bruised; stems hoary-tomentulose: lvs. ovate-lanceolate to lanceolate, 3–6 cm. long, acutish, unequally and coarsely serrate, pubescent at first, finally glabrescent, glandular; petiole 3–8 mm. long: fls. blue, in 2–6-fld. remote whorls in slender spikes forming terminal panicles 30–45 cm. long; calyx densely villous; corolla 8–10 mm. long. Fl.VIII–IX. B.M.8441(c). R.H.1905:344,t.(c). Gn.80:562(h);88:725. S.L.286(h). Afghan. to W. Himal. and Tibet. Cult. 1904. Zone (V).—Valued chiefly for its late blue fls.

6. **SATURÈJA** L. SAVORY. Herbs or subshrubs of aromatic odor: lvs. opposite, narrow and entire or broader and toothed: fls. in few- to many-fld. whorls in the axils of foliage lvs. or forming terminal panicles or racemes, calyx tubular-campanulate, 5-toothed or sometimes 2-lipped; corolla 2-lipped,

the upper lip flat, emarginate or entire, the lower lip 3-parted with flat lobes, the middle one usually larger and emarginate; stamens 4; nutlets ovoid, smooth. (Ancient Latin name of the plant.) About 130 species in the warmer regions of both hemispheres.

S. montàna L. WINTER S. Half-evergreen upright subshrub, to 35 cm., of pleasant aromatic odor; stems minutely pubescent: lvs. sessile, narrow-oblong to oblanceolate, 1–2.5 cm. long, acute, the lower obtuse, entire, glandular, hispid-ciliate: floral whorls few- to many-fld. forming terminal leafy panicles; calyx setulose and glandular, campanulate, 10- or 13-nerved, with unequal subulate lobes, slightly 2-lipped; corolla white or purplish, about 1 cm. long; tube little or not exserted. Fl.VII–VIII. R.I.18:t.72(c). F.D.18:t. 1800(c). S.L.382(h). Gs.6:191(h). (*Calamintha m.* Lam., *Micromeria m.* Reichenb.) S. Eu. and N. Afr. to Cauc. Cult. since ancient times. Zone VI?—Chiefly grown as a pot-herb.

7. **HYSSÒPUS** L. HYSSOP. Subshrub of aromatic odor: lvs. opposite, narrow, entire: fls. in many-fld. whorls forming leafy spikes; calyx tubular, 15-nerved, equally 5-toothed; corolla 2-lipped, with flat lobes, upper lip 2-lobed, lower 3-lobed; stamens 4, exserted, divergent: nutlets ovoid and slightly 3-sided, smooth. (Ancient Greek name of uncertain application.) One Mediterranean species.

H. officinàlis L. Slender upright subshrub to 45 cm., nearly glabrous; brts. quadrangular: lvs. subsessile, linear to oblong, 2–4 cm. long, acute or the lower obtuse, minutely ciliate, glandular-dotted on both sides: floral whorls in terminal secund spikes 6–12 cm. long; corolla usually blue, about 1 cm. long. Fl.VI–IX. B.M.2299(c). R.I.18:t.58(c). F.D.18:t.1812(c). Mediterr. Region to C. Asia. Cult. since ancient times. Zone V.—Var. **albus** West. Fls. white.—Var. **ruber** West. Fls. red. F.D.18:t.1812,f.B(c).—Grown chiefly as a pot-herb.

8. **THÝMUS** L. THYME. Small evergreen or half-evergreen shrubs and subshrubs, of aromatic odor: lvs. opposite, small, entire: floral whorls usually few-fld., axillary and distant or forming terminal clusters or short spikes; calyx ovoid to cylindric, hairy in throat, 10–13-nerved, 2-lipped, upper lip 3-toothed, the lower lip cut into 2 ciliate teeth; corolla somewhat 2-lipped, upper lip nearly flat, emarginate, the lower 3-lobed; tube exserted or included: nutlet ovoid or oblong, smooth. (Ancient Greek name.) About 35 species in Eu., W. Asia and Afr.

A. Stems upright: lvs. tomentulose beneath ..... 1. *T. vulgaris*
AA. Stems prostrate: lvs. glabrous or slightly pubescent beneath ..... 2. *T. Serpyllum*

1. **T. vulgàris** L. COMMON T. Upright subshrub, to 20 cm. high; brs. usually whitish pubescent: lvs. subsessile, ovate-oblong to linear, 4–15 mm. long, tomentulose beneath, revolute: floral whorls in head-like clusters or in interrupted spikes; pedicels slender, as long as calyx-tube; corolla lilac or purplish, about 6 mm. long; tube little or not exserted; stamens scarcely exserted. Fl.V–VI. R.I.18:t.63,f.1(c). F.D.18:t.1796(c). S. Eu. Cult. since ancient times. Zone V.—Grown as a pot-herb.

2. **T. Serpýllum** L. MOTHER-OF-THYME. Prostrate subshrub or nearly herbaceous, cespitose or trailing, with rooting stems: ascending at the ends, pubescent all around or on opposite sides: lvs. short-petioled, ovate or elliptic to oblong, 5–12 mm. long, obtuse, broad-cuneate, glabrous beneath or pubescent and ciliate, floral lvs. similar: floral whorls in dense terminal heads or the lower ones distant; calyx pubescent; corolla purplish, about 6 mm. long;

tube scarcely exserted; stamens exserted. Fl.VI–IX. R.I.18:t.63,f.2,64–67(c). F.D.18:t.1797(c). S.St.245(h). H.B.4:7(h). Eu., W. Asia, N. Afr. Cult. since centuries. Zone IV.—An exceedingly variable species divided into many spontaneous subspecies and varieties often considered distinct species; there are also a number of garden forms; one of the most distinct vars. sometimes cult. is Var. **lanuginòsus** Sweet. Stems pubescent all around: lvs. on both sides and infl. pubescent with long white hairs. F.D.18:t.1997,II,f.B(c). Gn.87:264(h). (*T. l.* Mill.)—The plant is adapted for the rock garden and rocky slopes; also used as an edging plant.

9. **ELSHOLTZIA** Willd. Herbs or subshrubs, usually aromatic: lvs. opposite, short-petioled, serrate, often glandular-punctate: fls. small, in many-fld. whorls forming one-sided spikes; calyx tubular or campanulate, 5-toothed; corolla 2-lipped or slightly so, upper lip emarginate, concave, lower 3-lobed; stamens 4, usually exserted; anther-cells diverging; anterior part of disk developing into a nectary often longer than ovary: nutlets ovoid to ovoid-oblong, smooth or rugose. (After Johann Sigismund Elsholtz, Prussian physician and botanical writer; 1623–1688.) About 20 species in E. and C. Asia, south to Java; 1 in Eu. and 1 in Abyssinia.

E. Stauntòni Benth. Subshrub to 1.5 m., with terete pubescent brts.: lvs. ovate-oblong to oblong-lanceolate, 6–12 cm. long, acuminate, serrate, bright green and glabrous above, lighter green and densely glandular beneath: fls. lilac-purple, in dense one-sided spikes 10–20 cm. long usually panicled at end of brs.; stamens and style long exserted; nutlets smooth. Fl.IX–X. B.M.8460(c). R.H.1914:60,t(c). G.C.III.51:21. Gn.75:533. M.G. 25:541(h),542. S.L.194(h). N. China. Intr. 1905. Zone V.—Chiefly valued for its late-appearing profusely produced spikes of lilac-purple fls.

A related species is **E. fruticòsa** Rehd. Subshrub to 2 m.: lvs. elliptic-oblong to lanceolate, pubescent on the veins beneath and glandular: fls. white, in slender spikes 5–14 cm. long. L.B.487(c). Wallich, Pl. As. Rar.1:t.33(c). (*E. polystachya* Benth.) Himal., W. China. Intr. about 1903? Zone VII?

Fam. 104. SOLANACEAE Pers. NIGHTSHADE FAMILY

Herbs or shrubs, sometimes climbing, or small trees: lvs. usually alternate, entire or toothed to pinnate, exstipulate: fls. mostly perfect and regular, solitary or cymose, often seemingly extra-axillary; calyx 5-lobed; corolla rotate or campanulate to tubular, sometimes irregular, the 5 lobes valvate or plicate in bud; stamens usually as many as corolla-lobes, often connivent by their anthers, sometimes 1 or more sterile; ovary superior, usually with a disk at base, mostly 2-celled, with usually many ovules on axile placentae; style 1; stigma simple or lobed: fr. a berry or caps.; seeds albuminous, rarely without albumen; embryo straight or curved.—About 75 genera and more than 2000 species in trop. and temp. regions of both hemispheres.

A. Corolla rotate; anthers connivent around the stigma: climbing plant.....1. *Solanum*
AA. Corolla salverform; anthers distinct: upright or sarmentose shrubs.
B. Stamens exceeding the tube: brs. often spiny.....2. *Lycium*
BB. Stamens included: brs. unarmed.....3. *Cestrum*

1. **SOLÀNUM** L. NIGHTSHADE. Herbs or shrubs, many climbing, sometimes trees: brs. sometimes spiny: lvs. alternate, simple or compound: infl. mostly supra-axillary or opposite the lvs., cymose, rarely fls. solitary; calyx 5–10-toothed or -parted, persistent; corolla rotate or shallow-campanulate, the lobes plicate in bud, variously colored, often showy; stamens 5, with short filaments, inserted on the throat of the corolla; anthers connivent, opening at apex by a pore or short slit; ovary usually 2-celled, many-ovuled:

fr. a berry. (Ancient Latin name, probably from *solari*, to quiet; referring to its medicinal properties.) More than 1200 species chiefly in trop. and subtrop. regions of both hemispheres.

S. Dulcamàra L. Bitter-sweet. Suffruticose climber, to 2.5 m.; brts. glabrous or pubescent: lvs. entire, ovate to ovate-oblong, or with 1–3 pairs of lobes at base, 4–10 cm. long, acuminate, usually cordate, bright green and usually sparingly pubescent; petiole 1–3 cm. long: fls. violet in long-peduncled cymes; corolla-lobes oblong-lanceolate, reflexed, with 2 green spots near base: fr. ovoid, about 1 cm. long, scarlet. Fl.vi–viii; fr.viii–x. S.O.3:t.146(c). R.I.20:t.12,f.1,2(c). F.D.16:t.1600(c). Eu., N. Afr. to E. Asia; often naturalized in N. Am. Cult. 1561. Zone V.—Var. **album** West. Fls. white.—Var. **variegàtum** West. Lvs. variegated with white.—Var. **villosíssimum** Desv. Brts. and lvs. densely pubescent. (Var. *litorale* Brand, var. *tomentosum* Koch.)—Var. **indivìsum** Boiss. All lvs. undivided, ovate-oblong: fr. larger. (Var. *persicum* Dipp., *S. persicum* Willd.)—The scarlet frs. are conspicuous and ornamental, but poisonous.

2. **LÝCIUM** L. Box-thorn. Deciduous or evergreen shrubs, thorny or unarmed; winter-buds small, superposed, with few outer scales: lvs. alternate, often fascicled, short-petioled, entire: fls. axillary, solitary or clustered, usually slender-stalked; calyx campanulate, 5-toothed or irregularly 3–5-toothed; corolla funnelform or salver-shaped, with usually 5-lobed limb; stamens usually 5, usually exserted; ovary 2-celled: fr. a berry with few to many seeds, usually red. (*Lykion*, ancient Greek name for a thorny shrub.) About 100 species in temp. and subtrop. regions of both hemispheres.—Ornamental shrubs chiefly valued for their showy scarlet berries.

A. Fls. violet or purplish; limb not less than ⅓ as long as tube; filaments pubescent at base.
B. Lvs. and brts. glabrous; calyx-teeth short and irregular.
C. Corolla-tube shorter than limb, rather wide: lvs. rhombic-ovate to ovate-lanceolate. 1. *L. chinense*
CC. Corolla-tube longer than limb, narrowed below the middle: lvs. usually lanceolate. 2. *L. halimifolium*
BB. Lvs. and brts. puberulous: corolla-tube shorter than limb; calyx-lobes 5, lanceolate. 3. *L. Grevilleanum*
AA. Fls. greenish white; limb about ⅓ as long as tube; filaments glabrous. . . . . 4. *L. pallidum*

1. **L. chinénse** Mill. Chinese Matrimony-vine. Rambling shrub with arching and often prostrate brs. to 4 m. long, usually unarmed; brts. light yellowish gray: lvs. rhombic-ovate to ovate-lanceolate, 3–8 cm. long, acute or obtusish, broad- to narrow-cuneate, bright green; petioles rarely exceeding 1 cm.: fls. 1–4; pedicels 3–8, rarely 12 mm. long; calyx 3–5-toothed, usually divided less than ½, with acute lobes; corolla purple, about 1 cm. long: fr. ovoid to oblong, 1.5–2.5 cm. long, scarlet to orange-red. Fl.vi–ix; fr.viii–x. R.I.20:t.14,f.2,3(c). G.F.4:102. N.D.1:t.30(c). F.E.28:641(h). G.W.15: 346(h). (*L. barbarum* Lour., not L.) E. Asia. Intr. before 1709. Zone V. —Var. **ovàtum** Schneid. Lvs. rhombic-ovate, to 10 cm. long: fr. very obtuse and impressed at apex, large. (Var. *rhombifolium* Bean, *L. rhombifolium* Dipp.)—Very handsome with its long brs. laden with scarlet fr.; lvs. remaining green until very late in autumn.

2. **L. halimifòlium** Mill. Common Matrimony-vine. Upright or spreading shrub with arching or recurving brs., to 3 m., usually spiny; brts. light grey: lvs. oblong-lanceolate to lanceolate, rarely elliptic-lanceolate, 2–6 cm. long, acute or obtusish, narrowed into a slender petiole 5–20 mm. long, grayish green, thickish: fls. 1–4; pedicels 8–20 mm. long; calyx usually 1–3-lobed, divided about ½, with obtuse lobes: corolla dull lilac-purple: fr. ovoid or

short-oblong, 1–2 cm. long, scarlet to orange-red. Fl.VI–IX; fr.VIII–X. R.I. 20:t.14,f.1,2(c). F.D.16:t.1595(c). B.B.3:168. (*L. barbarum* Ait., not L., *L. vulgare* Dun., *L. flaccidum* K. Koch.) S. E. Eu. to W. Asia; sometimes escaped from cult. Long cult. Zone V.—Var. **lanceolàtum** Schneid. Lvs. lanceolate: fr. ellipsoid. N.D.1:t.32(c). (*L. l.* Poir.)—Var. **subglobòsum** Schneid. Dwarfer: lvs. lanceolate: fr. subglobose.—Sometimes used for hedges.

Related species are: **L. turcomânicum** Turcz. Slender spiny shrub: lvs. lanceolate, 2–7 cm. long, thickish, with obsolete veins: fls. short-stalked, pink, small, with slender tube nearly twice as long as limb; calyx irregularly 5-toothed: fr. small, globose, red. Miers, Ill. S. Am. Pl.2:t.69E. Turkest. Intr. before 1890. Zone V?—**L. ruthènicum** Murr. Upright spiny shrub: lvs. linear or linear-lanceolate, 1–3 cm. long, thickish: fls. about 1.2 cm. long; calyx usually 3-toothed with broad obtuse teeth: fr. black. Intr. 1804. Miers. Ill. S. Am. Pl.2:t.70A. D.H.1:27. S. Russia to Persia and W. Siberia. Intr. 1804. Zone VI?—*L. barbarum* L. and *L. europaeum* L. which are not hardy within our area are sometimes confused with *L. halimifolium*, but are easily distinguished by the glabrous filaments and the narrower and smaller lvs. and the second by the slenderer corolla-tube.

3. **L. Grevilleànum** Gillies. Much-branched shrub to 2 m., with unarmed spreading or decumbent brs.; brts. puberulous when young: lvs. obovate to oblanceolate, 1–2 cm. long, on vigorous shoots to 5 cm. long, narrow-cuneate, ciliate and puberulous, rather fleshy: fls. solitary or 2, about 1 cm. across; calyx-teeth lanceolate, ciliate; corolla funnelform, yellowish white, with purplish limb, lobes longer than tube; filaments hairy at base: fr. globose, about 8 mm. across, orange-red. Fl.VI–VIII. Miers, Ill. S. Am. Pl.2:t.73F. S.H.2:f.396h–k. Argentine. Cult. 1890. Zone VIII?

The similar **L. chilénse** Bert. differs chiefly in its glandular pubescence and the broader more obtuse lvs. and is still tenderer. Chile.

4. **L. pállidum** Miers. Much branched upright shrub to 2 m., with spreading often tortuous spiny brs.: lvs. partly fascicled, lanceolate to oblanceolate, 1.5–5 cm. long, narrow-cuneate, glaucous, somewhat fleshy: fls. 1 or 2, nodding; calyx-lobes 5, triangular-ovate, acute: corolla funnelform, about 2 cm. long, greenish yellow, tinged purplish, tube about 3 times as long as the short rounded lobes: fr. subglobose, 1.2 cm. across, scarlet, usually sparingly produced. Fl.V–VI; fr.VII–VIII. B.M.8440(c). G.C.III.46:232. G.F.1:341. B.S.2:63. M.G.23:209. S.L.258(h). S. Utah to N. Mex. and Mex. Cult. 1878. Zone (V).—Distinct shrub, attractive in bloom.

3. **CÉSTRUM** L. Deciduous or evergreen shrubs or small trees: lvs. simple and entire: fls. in axillary or terminal cymes; calyx 5-toothed, short; corolla salver-shaped, variously colored, with long slender tube, enlarged or contracted at the mouth, with short spreading limb; stamens inserted about the middle of the tube, included; ovary 2-celled, with 3–6 ovules in each cell; style slender: fr. a few- or 1-seeded small berry; seed albuminous. (*Kestron*, Greek plant name of uncertain application.) About 150 species in trop. and subtrop. Am.

C. parqui L'Hérit. WILLOW-LEAVED JESSAMINE. Upright shrub to 2 m., glabrous: lvs. lanceolate, 5–14 cm. long, acuminate, cuneate, bright green, slightly paler beneath; petiole 5–10 mm. long: fls. in axillary and terminal cymes forming panicles at end of brs.; corolla yellowish green, fragrant at night; tube slender, dilated at mouth, about 2 cm. long, with spreading acute lobes: fr. violet-brown, 3–4-seeded. Fl.VII–IX. B.M.1770(c). S.O.3:t.133(c). Chile. Intr. 1787. Zone VIII.—Grown chiefly for its fragrant fls.; even when killed to the ground the young shoots springing up will bloom the same season.

Fam. 105. SCROPHULARIACEAE Lindl. FIGWORT FAMILY

Herbs, shrubs or trees: lvs. alternate, opposite or verticillate, exstipulate: fls. perfect, usually irregular, in cymes, racemes or panicles, or solitary and axillary: calyx 4–5-toothed or -parted: corolla rotate to campanulate, or with cylindric tube, 4–5-lobed with subequal lobes or 2-lipped; stamens usually 4, didynamous, inserted on the corolla-tube, sometimes 2 or 5; ovary superior, perfectly or imperfectly 2-celled, with central placentae and usually many ovules: fr. a caps. or berry; seeds albuminous.—About 180 genera and 3000 species widely distributed in both hemispheres,

A. Stamens 4.
B. Lvs. not exceeding 6 cm., usually narrow: low shrubs or subshrubs: caps. septicidal. 1. *Pentstemon*
BB. Lvs. large and broad: trees: caps. loculicidal. 2. *Paulownia*
AA. Stamens 2: low shrubs with small usually evergreen, sometimes scale-like lvs. 3. *Veronica*

1. PENTSTÈMON Ait. Perennial herbs or small shrubs: lvs. opposite or whorled, the lower ones petioled, upper sessile, entire or serrate: fls. in terminal racemes or panicles; calyx 5-parted, with imbricated segments; corolla tubular, usually dilated at throat, 2-lipped, upper lip 2-lobed, lower 3-lobed; fertile stamens 4, the 5th sterile and sometimes bearded; style filiform, with capitate stigma: fr. a septicidally dehiscent caps., with numerous wingless seeds. (Greek *pente*, five, and *stemon*, stamen; the 5th stamen being present, though sterile.) Syn.: *Penstemon* Schmidel, *Pentastemon* Batsch. About 150 species in N. Am. and Mex., one in E. Asia.—Handsome low shrubs or subshrubs best suited for well drained positions in the rock-garden.

A. Anther-cells opening their whole length or nearly their whole length, diverging: lvs. usually serrate.
B. Corolla blue, purple or yellowish, shallowly 2-lipped, with funnelform tube.
C. Anthers bearded: infl. racemose. (Sect. ERIANTHERA Benth.). 1. *P. Scouleri*
CC. Anthers glabrous or ciliate: infl. paniculate. (Sect. EUPENTSTEMON Benth.) 2. *P. Lemmoni*
BB. Corolla scarlet, tubular and strongly 2-lipped. (Sect. ELMIGERA Benth.). 3. *P. cordifolia*
AA. Anther-cells opening only on the upper part by short confluent slits, horseshoe-shaped: lvs. entire. (Sect. SACCANTHERA Benth.)
B. Corolla scarlet, tubular and strongly 2-lipped: lower lvs. petioled. 4. *P. Bridgesii*
BB. Corolla purple, with funnelform tube: all lvs. sessile. 5. *P. heterophyllus*

1. P. Scoùleri Dougl. Low shrub with usually ascending stems, procumbent at base, 20–50 cm. tall; young brts. puberulous: lvs. lanceolate to spatulate or linear-lanceolate, 2–4 cm. long, acute, narrowed into a short petiole, sharply serrulate except at base: racemes 5–11-fld., sparingly and minutely glandular-pubescent; sepals ovate-lanceolate, acuminate, about 1 cm. long, glandular-hairy; corolla tubular-funnelform, lilac-purple, 3.5–4 cm. long; sterile filament long and glabrous. Fl.v–vii. B.M.6834(c). B.R.1277(c). D.H.1:41. G.C.III.7:204;65:39(h). (*P. Menziesii* var. *Scouleri* Gray.) B. C. to Idaho and n. Calif. Intr. 1828. Zone V.

Closely related species are: **P. Menzièsii** Hook. To 20 cm. high: lvs. obovate or elliptic, 8–20 mm. long, obtuse, rarely acutish, serrulate; corolla purple, 2.5–3.5 cm. long; sterile filament short, sometimes hairy; sepals ovate-lanceolate. Wash. to B. C. and Alb. Intr. ?—**P. Davidsònii** Greene. Nearly herbaceous: lvs. obovate or elliptic, 6–8 mm. long, entire: racemes 1-5-fld., glandular-hairy; corolla lilac-purple, 2.5 cm. long. (*P. Menziesii* var. *D.* Piper.) N. Calif. Cult. 1898. Zone VII?—**P. Newbérryi** Gray. To 40 cm. high: lvs. ovate-elliptic or elliptic to ovate-oblong, 1–3 cm. long, acute or acutish, serrulate: fls. rosy-purple or carmine, 2–3 cm. long; sepals lanceolate, long-acuminate. G.C.1872:969. (*P. Menziesii* var. *N.* Gray, var. *Robinsoni* Mast., *P. sonomensis* Greene.) Wash. to N. Calif. Cult. 1872.

3. P. Lemmòni Gray. Upright shrub to 1 m.: lvs. subsessile, the pairs distant, ovate to oblong-lanceolate, 1–3 cm. long, acute, subcordate or truncate, serrulate: infl. paniculate; axis and peduncles glabrous; sepals ovate-

lanceolate, like pedicels glandular-hairy; corolla 1.2 cm. long, pinkish yellow, upper lip red-violet inside, lower lip striped red-violet. Calif. Cult. 1898. Zone VIII?

3. **P. cordifòlius** Benth. Sarmentose shrub; brts. obscurely quadrangular: lvs. short-petioled, ovate, 2–5 cm. long, acute, cordate to truncate, serrate or denticulate: fls. in glandular-hairy terminal panicles; sepals ovate-lanceolate, glandular-hairy; corolla scarlet; tube straight, 2–2.5 cm. long; limb 1.2 cm. long, upper lip erect, lower deflexed. Fl.VI–VIII. B.M.4497(c). G.C.III.70: 102. Calif. Intr. 1848. Zone VIII?

A related species is **P. corymbòsus** Benth. Upright shrub to 50 cm.: lvs. elliptic to oblong, 1.2–2.5 cm. long, obtusish, cuneate or broad-cuneate, dentate, often obscurely so: fls. in corymbiform racemes. Calif. Cult. 1898. Zone VIII?

4. **P. Bridgèsii** Gray. Shrub to 60 cm., glabrous: lvs. spatulate to linear, 2–5 cm. long, obtuse or acutish, narrowed into the petiole, the upper ones sessile: infl. a panicle with 1–5-fld. peduncles and short pedicels; sepals ovate, glandular-pubescent; corolla 2.5 cm. long; tube only slightly dilated above the middle. Fl.VI–VIII. Calif. to Ariz. and Utah. Cult. 1898. Zone VIII?

5. **P. heterophýllus** Lindl. Upright shrub to 1.5 m., with slender brs.; glabrous: lvs. sessile or subsessile, lanceolate to linear, 2–6 cm. long, acute, narrow-cuneate: racemes elongated, sometimes paniculate at base, usually many-fld.; pedicels 3–10 mm. long; sepals ovate, acuminate, 3–4 mm. long, glabrous; corolla purple, 2.5–3 cm. long, with the tube much narrowed below the middle. Fl.VI–VII. B.M.3853(c). B.R.1899(c). Calif. Intr. 1828. Zone VIII?—The related *P. azureus* Benth. (B.M.7504) is nearly herbaceous and tenderer.

2. **PAULÒWNIA** Sieb. & Zucc. Deciduous trees; winter-buds with several outer scales, superposed: lvs. opposite, petioled, entire or shallowly lobed: fls. in terminal panicles; calyx deeply 5-lobed; corolla tubular-funnelform, with spreading oblique 5-lobed limb; stamens 4, with distinct spreading anther-cells, sterile stamen wanting: caps. loculicidally dehiscent by 2 valves; seeds very numerous, small, winged. (After Anna Paulowna, princess of the Netherlands.) About 10 species in China.

P. tomentòsa Steud. PAULOWNIA. Round-headed tree to 15 m., with stout spreading brs.; brts. densely soft-pubescent when young, becoming glabrous: lvs. broad-ovate to ovate, 12–25 cm. long, or on vigorous shoots to 50 cm. long, acuminate, cordate, entire or sometimes shallowly 3-lobed, pubescent above, densely so or tomentose beneath; petiole 8–20 cm. long: panicle pyramidal, 20–30 cm. long; calyx broad-campanulate, with 5 ovate obtuse lobes, rusty-tomentose like the pedicels; corolla funnelform-campanulate, 5–6 cm. long, pale violet, with darker spots and yellow stripes inside, glandular-pubescent outside; caps. ovoid, beaked, 3–4 cm. long, woody. Fl.IV–V; fr.IX–XI. S.Z.1:t.10(c). B.M.4666(c). G.C.III.51:430(h),431;56:150. Gn.60:130;80:406(h). S.L.285(h). (*P. imperialis* Sieb. & Zucc.) China, cult. in Japan; escaped in the E. States from s. N. Y. to Ga. Intr. 1834. Zone (V).—Var. **pállida** Schneid. Fls. pale, whitish violet: lvs. dull green above. (Var. *flore albo* Hort.)—Var. **lanàta** Schneid. Lvs. more densely yellowish tomentose beneath; calyx more tomentose, with longer acutish lobes. G.C.III.72:167(h). Intr. 1908.—Strikingly handsome in spring when covered with its large violet slightly fragrant fls. appearing just before the lvs.; unfortunately the fls. which are formed the previous season and remain naked during the winter are often winter-killed in the N. The large lvs. are also a prominent feature of the tree.

A related species is **P. Fargèsii** Franch. Tree to 20 m.; bark smooth; young brts. usually pilose or villous, soon glabrous: lvs. smaller, sparingly pubescent and glandular above, slightly pubescent beneath, entire or with few coarse teeth; panicle smaller; calyx tomentose with triangular acutish lobes; corolla whitish or lavender, slightly pubescent or glabrescent outside, 6 cm. long. W. China. Intr. about 1896. Zone VII or VIII?—*P. Fortunei* Hemsl. and *P. Duclouxii* Dode are probably not hardy within our area.

3. **VERÒNICA** L. Speedwell. Herbs or evergreen shrubs, rarely small trees: lvs. opposite, rarely alternate or whorled, the floral lvs. alternate: fls. in terminal or axillary racemes or sometimes solitary and axillary; calyx 4-, rarely 3- or 5-parted, corolla with usually short tube and spreading 4–5-lobed limb; stamens 2, exserted; caps. compressed, usually obtuse or emarginate, often turgid, 2-grooved, septicidally or loculicidally dehiscent: seeds few to many. (Named in honor of St. Veronica.) About 200 species chiefly in temp. and colder regions; the shrubby species almost all native of New Zealand and Australia.

A. Fls. in terminal racemes; caps. laterally compressed: suffruticose plants. (Subgen. VERONICASTRUM Benth.) ..... 1. *V. fruticans*
AA. Fls. in axillary racemes; caps. dorsally compressed: evergreen shrubs with entire lvs. (Subgen. HEBE Benth.)
B. Lvs. not scale-like.
C. Lvs. not imbricate: fls. in racemes.
D. Lvs. elliptic to oblong ..... 2. *V. Traversii*
DD. Lvs. narrow-oblong to elliptic-lanceolate ..... 3. *V. anomala*
CC. Lvs. imbricate, rounded or cordate at base: fls. in spikes.
D. Lvs. keeled, very short-petioled ..... 4. *V. buxifolia*
DD. Lvs. not keeled, sessile ..... 5. *V. amplexicaule*
BB. Lvs. scale-like, each pair connate at base.
C. Lvs. densely imbricate ..... 6. *V. Hectori*
CC. Lvs. in distant pairs ..... 7. *V. cupressoides*

1. **V. frúticans** Jacq. Procumbent, with ascending pubescent stems, to 20 cm. high, woody only at base: lvs. elliptic to oblong, 6–12 mm. long, crenulate or entire, glabrous: racemes 2–6-fld.; corolla blue, 1.2 cm. across; sepals elliptic, pubescent, eglandular: caps. ovoid, scarcely emarginate. Fls.VII–VIII. R.I.20:t.96,f.1,2(c). F.D.17:t.1649(c). E.P.IV.3b:84. (*V. saxatilis* Scop.) Eu. Intr. 1768. Zone V.

A closely related species is **V. fruticulòsa** L. Stems finely strigillose: lvs. oblong, 1–2 cm. long, obtuse, crenulate, sparingly hairy, finally glabrous, ciliolate: fls. pink, in loose racemes; sepals glandular-pubescent. R.I.20:t.96:f.3(c). F.D.17:t. 1648(c). (*V. frutescens* Scop.) S. Eu. Cult. 1796.

2. **V. Travérsii** Hook. f. Wide-spreading shrub to 2 m.; brts. minutely downy at first: lvs. crowded, short-stalked, elliptic-oblong to oblong-obovate, 1–2.5 cm. long, acute, cuneate, rather dull dark green: racemes near end of brts. 3–6 cm. long; sepals ovate, minutely ciliate; corolla white, 6–8 mm. across; tube twice as long as sepals. Fl.VII. B.M.6390(c). G.C.III.53:172. Gn.83: 172(h),384(h). B.S.2:640,t(h). N. Zeal. Intr. 1868. Zone VIII.

Related species are: **V. Balfouriàna** Hook. f. Shrub to 1 m.: lvs. elliptic, 8–16 mm. long, scarcely stalked: racemes stalked, 5–7 cm. long; corolla purple-blue, about 1 cm. across; tube as long as sepals. B.M.7556(c). N. Zeal. Cult. 1895. Zone VIII?—**V. vernicòsa** Hook. f. Low shrub, to 50 cm.; brts. minutely downy: lvs. elliptic to obovate, 4–12 mm. long, lustrous dark green: racemes usually in pairs, 1–2.5 cm. long, 4–8-fld.; corolla white; sepals narrow-oblong, obtuse. B.S.2:640. (*V. canterburiensis* Armstr.) New Zeal. Cult. 1894. Zone VIII.—**V. ellíptica** Forst. f. Shrub or small tree to 6 m., glabrous: lvs. short-stalked, elliptic-oblong, 1–2.5 cm. long, apiculate, truncate or rounded at base, margin with white pubescence, midrib prominent beneath: fls. white with purple lines, 1.2–1.5 cm. across, in 4–12-fld. racemes 2–3.5 cm. long. B.M.242(c). (*V. decussata* Ait.) New Zeal. Intr. 1776.—**V. speciòsa** R. Cunn. Shrub to 2 m.; brts. 2-edged at first, glabrous: lvs. very short-stalked, obovate to obovate-oblong, 5–10 cm. long, glabrous; racemes 3–7 cm. long; fls. dark reddish purple, 8 mm. across. B.M.4057(c). New Zeal.—Scarcely hardy in our area, but some of its hybrids are hardier.

3. **V. anómala** Armstr. Shrub to 2 m., of upright narrow habit; brts. slender, nearly glabrous: lvs. elliptic-lanceolate or narrow-oblong, 8–20 mm. long, acute, narrowed into a broad short stalk, slightly keeled, dark lustrous green: fls. white or pale pink, in spikes about 3 cm. long, panicled at end of brs.; corolla 6–8 mm. across, the slender tube twice as long as calyx; anthers blue; caps. ovate-oblong, glabrous. Fl.VI–VII. B.M.7360(c). B.S.2:634. New Zeal. Intr. 1883. Zone VIII.

V. a. × *Hectori* = *V. edinensis;* see under No. 6.

4. **V. buxifòlia** Benth. Stout shrub to 1.5 m.: lvs. imbricate, oblong-obovate, 8–12 mm. long, acute, truncate at base, lustrous dark green above, paler and usually minutely dotted beneath, keeled: fls. white, sessile, 6–8 mm. across, in spikes 1.5–2.5 cm. long, in the axils of the upper lvs. forming a corymbose head: caps. nearly twice as long as the narrow-oblong sepals. New Zeal. Cult. 1885. Zone VIII.

5. **V. amplexicaùlis** Armst. Upright or decumbent shrub, to 1 m., with spreading brs.: lvs. imbricate, sessile, oblong to elliptic-oblong, 1–2.5 cm. long, obtuse, cordate and somewhat clasping at base, glaucous: fls. white, sessile, 6 mm. across, in dense spikes about 3 cm. long, in the axils of the upper lvs.; ovary pubescent. B.M.7370(c). New Zeal. Intr. about 1880. Zone VIII.

Related species are: **V. pinguifòlia** Hook. f. Shrub with stout decumbent brs.: lvs. sessile, narrow-oblong to suborbicular, 1–2 cm. long, obtuse, cuneate, usually with red margin, dull bluish green, thick: fls. white in short dense spikes; ovary pubescent. B.M.6147,6587(c). Gn.28:293,t(c). (*V. carnosula* Hort., not Hook. f.) New Zeal. Intr. about 1868. Zone VIII.—**V. carnòsula** Hook. f. Usually prostrate: lvs. sessile, obovate, 8–20 mm. long, acute, narrowed at base, glaucous: fls. white: ovary glabrous. New Zealand. Cult. 1914.

6. **V. Hectòri** Hook. f. Stout shrub to 0.75 m.; brts. terete, upright, stiff: lvs. broad-ovate, 2–3 mm. long, obtuse, the pairs united below the middle, lustrous, puberulous on the margin: fls. pinkish or white, 6 mm. across, crowded at ends of brts., forming small ovoid heads; sepals narrow-oblong, as long as corolla-tube. B.M.7415(c). M.G.27:505(h). New Zeal. Cult. 1895. Zone VIII.

V. H. × *?anomala* = **V. edinénsis** J. F. Sm. Lvs. imbricate: fls. white in short spikes; possibly juvenile form of *V. Hectori.*

A related species is **V. lycopodioìdes** Hook. Lvs. triangular, about 2 mm. long, strongly keeled, therefore brts. 4-angled; lvs. of young plants larger and sometimes lobed: fls. white, 6 mm. across, in small heads 1–1.5 cm. across; anthers blue. B.M. 7338(c). New Zeal. Cult. 1894. Zone VIII?

7. **V. cupressoides** Hook. f. Globose shrub to 2 m., with very slender brts.: lvs. scale-like, about 1.5 mm. long, obtuse, in distant pairs; on young plants larger, to 6 mm. long, oblong to ovate, entire or lobed: fls. pale blue, 4 mm. across, in small 3–8-fld. heads: caps. obovoid. B.M.7348(c). G.C.III.3:20, 21;9:38. Gn.89:471(h). (*V. salicornioides* Hort., not Hook f.) New Zeal. Cult. 1888. Zone VIII?—Distinct species; the brts. resemble those of a cypress.

Other species in cult. which may be hardy in our area are: *V. Armstrongii* T. Kirk, *V. chathamica* J. Buch., *V. Colensoi* Hook. f., *V. Darwiniana* Colens., *V. decumbens* Armst., *V. diosmifolia* R. Cunn., *V. loganioides* Armst., *V. macrocarpa* Vahl, *V. macroura* Hook. f., *V. monticola* Armst., *V. subalpina* Cockayne, *V. tetragona* Hook. f., *V. tetrasticha* Hook. f. and others.

106. BIGNONIACEAE Pers. BIGNONIA FAMILY

Trees, shrubs or herbs, often climbing, usually by tendrils: lvs. opposite, rarely alternate, simple or compound, exstipulate: fls. perfect, irregular, usually large and showy, in terminal or axillary racemes or panicles; calyx tubular or campanulate, 5-toothed or truncate, sometimes spathe-like; corolla cam-

panulate, funnelform or tubular, with 5-lobed, usually oblique limb, rarely 2-lipped; fertile stamens usually 4, didynamous, with one sterile stamen, sometimes two with 3 sterile stamens, rarely 5 fertile stamens, inserted on the corolla-tube; ovary superior with a disk at the base, 1- or 2-celled; ovules numerous on parietal placentae; style slender with 2-lobed stigma: fr. a loculicidally or septifragally (the valves separating from the central septum) dehiscent caps., rarely fleshy and indehiscent; seeds numerous, compressed, winged.—About 100 genera and 600 species, in trop. and subtrop. regions of both hemispheres, few extending into temp. regions.

A. Lvs. compound, climbing plants, rarely shrubby.
B. Plants with tendrils.
C. Lvs. with 1 pair of lfts.; ovary 2-celled.....1. *Bignonia*
CC. Lvs. bipinnate; ovary 1-celled.....2. *Eccremocarpus*
BB. Plants without tendrils: lvs. pinnate.....3. *Campsis*
AA. Lvs. simple: trees.....4. *Catalpa*

1. **BIGNÒNIA** L. Evergreen high climbing vine: lvs. opposite, 2-foliolate, the rachis ending in a branched tendril clinging by small disks: fls. in axillary cymes; calyx campanulate, shallowly 5-lobed or truncate; corolla funnelform-campanulate, with spreading, slightly 2-lipped limb; stamens 4, included, inserted near base of corolla: disk annular; ovary linear, many-ovuled: caps. linear, flattened parallel to the partition, septifragally dehiscent, with leathery valves; seeds elliptic, winged. (After Abbé Jean Paul Bignon, court librarian to Louis XIV.; 1662–1743.) Syn.: *Anisostichus* Bur., *Doxantha* Schum., Miers in part.) One species in N. Am.

B. capreolàta L. Cross-vine. Climbing to 20 m.; glabrous: petiole 1–2 cm. long; lfts. 2, stalked, oblong-ovate to oblong-lanceolate, 5–15 cm. long, obtusely acuminate, cordate, entire: cymes short-stalked, 2–5-fld., pedicels 2–4 cm. long: corolla red-orange, lighter within, 4–5 cm. long, lobes rounded about ¼ as long as tube: caps. 10–17 cm. long, compressed. Fl.v–vi. B.M. 864(c). Gng.1:370–1. (*Doxantha c.* Miers, *Anisostichus c.* Bur., *B. crucigera* L., partly.)—Trumpet-flower, Quarter-vine.) Va. and S. Ill. to Fla. and La. Cult. 1700. Zone (V).—Var. **atrosanguinea** Hook. f. Lfts. longer and narrower; fls. dark red-purple. B.M.6501(c).—Handsome vine with showy large fls.

2. **ECCREMOCÁRPUS** Ruiz & Pav. Vines climbing by tendrils or twining: lvs. opposite, pinnate or bipinnate: fls. yellow, orange or scarlet, in terminal racemes; calyx campanulate, with 5 valvate lobes; corolla with elongated tube and small, 5-lobed or 2-lipped limb; stamens 4, included; disk annular: caps. ovoid or ellipsoid, 1-celled, loculicidal; seeds orbicular, with broad wing. (Greek *ekkrĕmes*, pendulous, and *karpos*, fruit.) Three or 4 species in Peru and Chile.

E. scáber Ruiz & Pav. Climbing to 4 m.; glabrous; stems grooved: lvs. bipinnate, the primary pinnae with 3–7 lfts.; lfts. ovate to oblong-ovate, 8–30 mm. long, acute or obtuse, often cordate, entire or serrate: racemes 10–15 cm. long; corolla orange-red, 2–2.5 cm. long, tubular, ventricose above the middle, constricted at mouth, with small rounded lobes: caps. 3–3.5 cm. long. Fl.vi–ix. B.M.6408(c). B.R.939(c). S.H.2:f.405a-g. (*Calampelis scabra* Don.) Chile. Intr. 1824. Zone VIII.—Handsome vine, with showy fls. in summer; where it is not perfectly hardy, it may be treated as an annual or perennial.

3. **CAMPSIS** Lour. Trumpet-creeper. Deciduous shrubs usually climbing by aërial rootlets: lvs. opposite, odd-pinnate; lfts. serrate: fls.

orange to scarlet, in terminal cymes or panicles; calyx tubular-campanulate, 5-lobed; corolla funnelform, enlarged above the calyx, with large, spreading, 5-lobed, oblique limb, lobes rounded; stamens 4, didynamous, included: ovary 2-celled, with large disk at base; caps. elongated, stipitate, loculicidally dehiscent, with leathery valves separating from the septum; seeds numerous, compressed, with 2 large wings. (Greek *kampsis*, curvature; referring to the curved stamens.) One species in N. Am. and 1 in E. Asia.

A. Lfts. pubescent beneath at least along the midrib: calyx-teeth short, triangular-ovate. ..... 1. *C. radicans*

AA. Lfts. glabrous beneath: calyx 5-lobed to the middle ..... 2. *C. chinensis*

1. **C. radìcans** Seem. Climbing to 10 m. or more, with aërial rootlets: lfts. 9–11, short-stalked, elliptic to ovate-oblong, 3–6 cm. long, acuminate, cuneate, serrate: fls. usually orange outside, with scarlet limb; calyx-lobes triangular, much shorter than the tube; corolla tubular-funnelform, 6–9 cm. long, the tube almost 3 times as long as the calyx, limb 4–5 cm. broad: caps. cylindric-oblong, 8–12 cm. long, beaked, keeled along the sutures. Fl.VII–IX. B.M.485(c). M.N.II.2:t.1(c). B.C.2:651. (*Bignonia r.* L., *Tecoma r.* Juss. —Trumpet-vine, Trumpet-Honeysuckle.) Pa. to Mo., Fla. and Tex. Intr. 1640. Zone V.—Var. **mìnor** Voss. Fls. smaller, scarlet. Gn.82:446—Var. **praècox** Schneid. Vls. scarlet, appearing in June.—Var. **flàva** Rehd. Fls. orange-yellow. (Var. *aurea* Rehd., *T. r.* var. *lùtea* Kirchn.) Cult. 1842.—Var. **atropurpúrea** Voss. Fls. larger, deep scarlet.—Var. **speciòsa** Voss. Scarcely climbing, usually a bush with long slender stems: lfts. smaller, elliptic, abruptly long-acuminate: fls. orange-red, with rather straight tube, limb about 3 cm. across.—Handsome climbing shrub firmly clinging to walls and tree-trunks, with large brilliantly colored fls. in summer.

2. **C. chinénsis** Voss. CHINESE T. Climbing, with few or no aërial rootlets: lfts. 7–9, ovate to ovate-lanceolate, 3–6 cm. long, acuminate, serrate, glabrous: fls. in larger and looser terminal cymes or panicles; corolla scarlet, funnelform-campanulate, shorter and broader; tube little or not exceeding the lanceolate calyx-lobes, limb 7–8 cm. across: caps. obtuse at apex. Fl.VIII–IX. B.M. 1398(c),3011(c). Gn.47:373. G.F.3:393. B.C.2:652. (*Bignonia c.* Lam., *Tecoma c.* K. Koch, *T. grandiflora* Loisel.) China, cult. in Japan. Intr. 1800. Zone VII?—Var. **Thunbérgii** Voss. Fls. bright scarlet, with very short tube and reflexed lobes. (*Tecoma T.* Sieb.)—Less high climbing and showier than the preceding species; blooms when quite small.

C. c. × *radicans* = **C. hýbrida** Zabel. Intermediate: lfts. 7–11, usually pubescent on the veins beneath: fls. in loose panicles; calyx divided about ⅓ into acuminate lobes much shorter than the corolla-tube; corolla about 8 cm. long and 5–6 cm. across. S.T.1:t.47. M.G.19:123. (*Tecoma h.* Jouin, *T. intermedia* Schelle, *Bignonia Princei grandiflora* Hort., *B. radicans grandiflora atropurpurea* Hort.) Orig. about 1883. Zone (V).—Almost as showy as No. 2, but hardier.

4. **CATÁLPA** L. Deciduous, rarely evergreen trees; winter-buds with several outer scales, terminal bud wanting: lvs. opposite, sometimes whorled, long-petioled, entire or coarsely lobed, 3–5-veined at base, usually with purple glandular spot in the axils of the veins beneath: fls. in terminal panicles or racemes; calyx irregularly splitting or 2-lipped; corolla campanulate, 2-lipped, with 2 small upper and 3 larger lower lobes; fertile stamens 2, included; style slightly longer than stamens: caps. cylindric, very long and narrow, separating into 2 valves, with numerous oblong seeds bearing a tuft of long white hairs on each end. (The Indian name of the tree.) About 10 species in N. Am., the West Indies and in E. Asia.

A. Fls. yellowish, 1.5–2 cm. long: lvs. usually lobed and usually nearly glabrous beneath. 1. *C. ovata*

AA. Fls. white or rosy-pink, 3–5 cm. long: lvs. not or rarely lobed.
B. Infl. glabrous: lvs. glabrous beneath or pubescent with simple hairs.
C. Lvs. pubescent beneath, to 30 cm. long: fls. in a large panicle.
D. Lvs. abruptly acuminate: fls. 4–5 cm. across; panicle many-fld. . 2. *C. bignonioides*
DD. Lvs. long-acuminate; fls. about 6 cm. across: panicle several-fld. . . . . 3. *C. speciosa*
CC. Lvs. quite glabrous beneath, to 15 cm. long: fls. in a 3–12-fld. raceme. . . 4. *C. Bungei*
BB. Infl. pubescent: lvs. tomentose or densely pubescent beneath, with branched hairs. 5. *C. Fargesi*

1. **C. ovàta** Don. Tree to 10, or sometimes to 15 m., with spreading brs.; brts. glabrous, rarely sparingly hirsute: lvs. broad-ovate, 10–25 cm. long, abruptly acuminate, often shallowly 3–5-lobed, with broad abruptly acuminate lobes, dull green above, light green beneath and pubescent on the veins and veinlets or nearly glabrous; petiole 6–14 cm. long: panicle pyramidal, 10–25 cm. long: fls. yellowish white, striped orange inside and spotted dark violet: pod 20–30 cm. long, about 8 mm. wide. Fl.v. B.M.6611(c). S.I.2: t.71(c). L.I.t.10. (*C. Kaempferi* Sieb., *C. Henryi* Dode.) China, cult. in Japan. Intr. 1849. Zone V.

2. **C. bignonioìdes** Walt. Common C. Tree to 15, rarely 20 m. tall, with wide-spreading brs. forming a broad roundish head; bark light brown, separating into thin scales: lvs. often whorled, ovate, 10–20 cm. long, abruptly acuminate, truncate to subcordate at base, sometimes with a pair of small lobes, light green and nearly glabrous above, pubescent beneath, especially on the veins, of unpleasant odor when crushed; petiole 8–16 cm. long; panicle broad-pyramidal 15–20 cm. high; fls. 4–5 cm. across, white, with 2 yellow stripes inside and thickly spotted purple-brown, with oblique limb and entire lower lobes: fr. 20–40 cm. long, 6–8 mm. thick, with thin walls. Fl.vi–vii. B.M.1094(c). L.B.1285(c). S.S.6:t.288–9. G.C.III.44:10,t(h),312,t(h). B.S. 1:312,t(h). G.F.3:537, 539. (*C. Catalpa* Karst., *C. syringaefolia* Sims, *C. cordifolia* Moench.) Ga. to Fla. and Miss.; naturalized n. to N. Y. Intr. 1726. Zone V.—Var. **aûrea** Lav. Lvs. yellow. G.M.53:709.—Var. **Koèhnei** Dode. Lvs. yellow with a dark green blotch below the middle and green veins. G.W.19:445.—Var. **nàna** Bur. Dwarf; usually grafted high and forming a standard with dense broad head. Gng.3:195(h.) M.G.18:616. (*C. Bungei* Hort., not C. A. Mey.)—Handsome tree, very showy when in bloom.

C. b. × *ovata* = **C. hýbrida** Spaeth. Hybrid C. Intermediate; lvs. resembling more those of *C. ovata* and are purplish when unfolding, larger and usually more pubescent beneath, the fls. more like those of *C. bignonioides*, but smaller. Gt.47: t.1454(c). G.F.2:305. G.W.3:569(h). Jour. Hered.11:16–24. (*C. Teasii* Penh., *C. Teasiana* Dode.) Orig. about 1874.—Var. **japónica** Rehd. Lvs. broader and more abruptly acuminate, nearly glabrous beneath (*C. j.* Dode). B.D.1907:198. —Var. **purpúrea** Rehd. Young lvs. and shoots dark purple, nearly black when quite young, becoming finally green. (Var. *atropurpurea* Spaeth, *C. ovata* var. *purpurea* Bean.)—Handsome floriferous tree of rapid growth.

3. **C. speciòsa** Warder. Western C. Tree to 30 m., of pyramidal habit; bark red-brown, broken into thick scales: lvs. ovate to ovate-oblong, 15–30 cm. long, long-acuminate, truncate to cordate, bright green and glabrous above, densely pubescent beneath, inodorous: petiole 10–15 cm. long: panicle comparatively few-fld., about 15 cm. high: fls. about 6 cm. across, with slightly oblique limb, the lower lobe emarginate, inside with 2 yellow stripes and inconspicuously spotted purple-brown: caps. 20–45 cm. long, and about 1.5 cm. thick, with a thick wall. Fl.vi. R.H.1895:136,t(c). S.S.6:t.290–1. G.C.III.66:34(h). M.G.18:229–30(h). (*C. cordifolia* Jaume, not Moench.) S. Ill. and Ind. to W. Tenn. and N. Ark.; naturalized elsewhere. Cult. 1800. Zone V.—Handsome pyramidal tree of more vigorous growth and hardier than the preceding species; the wood very durable in soil and in water.

4. **C. Búngei** C. A. Mey. Small tree: lvs. triangular-ovate to ovate-oblong, 6–15 cm. long, long-acuminate, truncate to broad-cuneate, sometimes with 1 or few pointed teeth near base; dark green above, lighter beneath; petiole 2–8 cm. long: raceme corymbose, 3–12-fld.; corolla white, with purple spots inside, 3–3.5 cm. long; caps. 25–35 cm. long. S.H.2:403g-h,404e-g. N. China. Cult. 1877. Zone V.—Var. **heterophýlla** C. A. Mey. Lvs. with several pointed teeth near base; raceme 3–5-fld. Nouv. Arch. Mus. Paris,II.6:t.4. B.D.1907: 198B(l). (*B. h.* Dode.)—Pyramidal tree, apparently not as floriferous as the other species.

A closely related species is **C. Duclôuxii** Dode. Lvs. ovate, 12–20 cm. long, rounded or subcordate at base: raceme corymbose, 5–15-fld., the lower peduncles often with 2 or 3 fls.; fls. rosy pink, with darker spots and orange markings, about 3.5 cm. long: caps. to 60 cm. long. (*C. sutchuenensis* Dode.) C. and W. China. Intr. about 1900. B.D.1907:198. Zone VI or VII?

5. **C. Fargèsi** Bur. Tree to 20 m.; young shoots stellate-pubescent: lvs. ovate, 8–14 cm. long, long-acuminate, rounded or subcordate, 3-lobed on young plants, slightly pubescent above, densely so beneath; petiole 4–10 cm. long: raceme corymbose, 7–15-fld.; fl. about 3.5 cm. long, rosy pink or rosy purple, with purple-brown dots on throat. Nouv. Arch. Mus. Paris,II.6:t.3. (*C. vestita* Diels.) W. China. Cult. 1900. Zone V.

Fam. 107. GLOBULARIACEAE DC. GLOBULARIA FAMILY

Herbs or shrubs: lvs. alternate, simple, entire or toothed, exstipulate: fls. perfect, on a chaffy receptacle in involucrate heads; calyx usually 5-parted, regular or 2-lipped; corolla 2-lipped, with imbricate lobes; stamens 4, didynamous, exserted; the hypogynous disk reduced to a lateral gland; ovary superior, 1-celled, 1-ovuled; style filiform, with 1 or 2 stigmas: fr. a nutlet inclosed by the persistent calyx; seeds albuminous, with straight embryo.—Three genera and about 20 species in the Mediterr. region to Socotra and the Cape Verde Isls.

GLOBULÀRIA L. Herbs, subshrubs or shrubs: fls. in globose heads terminal on the main axis; corolla exceeding the calyx. (Name referring to the globular fl.-heads.) About 18 species in S. Eu. and W. Asia, mostly on the mts.

G. cordifòlia L. Procumbent subshrub to 10 cm. high; glabrous: lvs. obovate, 2–3 cm. long, emarginate and mucronate to 3-toothed at apex, gradually narrowed at base: fls. blue, in peduncled heads about 1 cm. across; corolla 2-lipped, upper lip 2-, lower lip 3-lobed with linear to linear-oblong lobes. Fl.v–viii. R.I.20:t.195,f.1,2(c). F.D.18:t.1770(c). S.H.2:f.405h-i. Mts. of S. Eu. Intr. before 1759. Zone V. Dwarf subshrub adapted for the rock-garden.—Truly fruticose species like *G. Alypum* L. from S. Eu. are not hardy within our area.

Fam. 108. PLANTAGINACEAE Juss. PLANTAIN FAMILY

Herbs, rarely shrubby: lvs. alternate or opposite, exstipulate: fls. perfect, rarely unisexual, usually in heads or spikes; calyx 4-cleft; corolla 4-lobed, with scarious imbricate lobes; stamens 4, exserted: ovary superior, 1–2-, rarely 4-celled; cells with 1 to many ovules: style and stigma 1: fr. a circumcissile caps. or nutlet inclosed by the persistent calyx; seeds often peltate, albuminous.—Three genera and about 200 species distributed over the whole earth.

PLANTÀGO L. Plaintain. Herbs, subshrubs or shrubs: lvs. alternate, rarely decussate: fls. perfect or polygamous, in dense head-like or cylindric

spikes; corolla small, with 4 scarious reflexed lobes; stamens 4, rarely 2, with long filaments and cordate anthers; ovary 2-, rarely 3–4-celled; each cell with 1 to many ovules; style filiform: caps. 2–many-seeded, opening transversely with the top falling off like a lid; seeds peltate, with straight embryo. (Ancient Latin name of the plant.) About 200 species mostly in the temp. regions.

P. Cýnops L. Ascending subshrub to 40 cm. high, slightly pubescent: lvs. opposite, linear, 3–7 cm. long, thickish and slightly triangular, with scabrid margins: fls. whitish, in small ovoid heads about 1 cm. long, on slender axillary peduncles 3–10 cm. long; bracts broad-ovate, acuminulate, with broad hyalin margin. Fl.VI–VII. F.D.20t.2021(c). S.H.2:f.628k. S. Eu. Cult. 1596. Zone V or VI?—Of no ornamental value, but of botanical interest as a woody representative of the genus.

Fam. 109. RUBIACEAE Juss. MADDER FAMILY

Trees, shrubs or herbs: lvs. opposite or whorled, usually entire, stipulate; the stipules of the opposite lvs. usually connate, sometimes reduced to a stipular line: fls. perfect, rarely unisexual, regular, sometimes slightly irregular, usually 4- or 5-merous; calyx with open, rarely imbricate lobes; corolla with cylindric to campanulate tube, rarely rotate, lobes usually valvate; stamens 4–5, inserted on the tube; ovary inferior, usually 2-celled, rarely 1- to many-celled; ovules 1 to many in each cell; style filiform, with capitate or branched stigma: fr. a caps., berry or drupe; seeds usually albuminous.—About 350 genera and 4500 species distributed over the whole earth, mostly in the tropics.

A. Fls. in dense globose peduncled heads: fr. a dry achene: lvs. 6–15 cm. long. . 1. *Cephalanthus*
AA. Fls. not in globose heads: lvs. usually smaller.
B. Plant twining: lvs. 5–12 cm. long: fls. in panicles; style deeply 2-parted: fr. berry-like, dry. . . . . 2. *Paederia*
BB. Plants upright or prostrate shrubs: lvs. 0.6–6 cm. long.
C. Fr. a caps.: style 5-parted at apex; fls. in clusters: upright small shrub. . 3. *Leptodermis*
CC. Fr. berry-like.
D. Style 2-parted to base: fls. 1–4: prostrate shrub. . . . . 4. *Coprosma*
DD. Style 4-parted at apex; fls. in peduncled pairs; trailing subshrub. . . . . 5. *Mitchella*

1. CEPHALÁNTHUS L. Buttonbush. Deciduous or evergreen shrubs or small trees; winter-buds small, often superposed, terminal bud wanting: lvs. opposite or whorled, entire, with triangular interpetiolar stipules: fls. small, 4-merous, sessile, in axillary globose heads; calyx-lobes short, ovate, obtuse; corolla with long slender tube and 4-lobed limb; stamens included; style long-exserted, with capitate stigma: fr. separating into 2 1-seeded nutlets. (Greek *kephalos*, head and *anthos*, flower.) About 6 species in Asia, Afr. and Am.

C. occidentàlis L. Deciduous shrub or rarely small tree to 5 m.: lvs. ovate to elliptic-lanceolate, 6–15 cm. long, acuminate, lustrous bright green above, lighter and glabrous or somewhat pubescent beneath; petiole 6–20 mm. long: fls. creamy-white, in globose head without the projecting styles 2.5–3 cm. across, on peduncles 3–6 cm. long. Fl.VII–IX. Add.5:t.169(c). Em.394,t. S.S.14:t.711. B.C.2:714. R.H.1889:280. N. B. and Ont. to Fla., Tex. and Calif.; also E. Asia. Intr. 1735. Zone IV.—Var. **angustifòlia** André. Lvs. oblong-lanceolate, usually in 3's. R.H.1889:281.—Var. **pubéscens** Raf. Brts. and lvs. soft-pubescent beneath. Ill. to Ga., La. and Tex. Tenderer. —Distinct shrub attractive in late summer with its slender-stalked fl.-heads.

2. PAEDÈRIA L. Twining shrubs: lvs. opposite, rarely whorled, petioled, entire; stipules small, deciduous: fls. perfect or polygamo-dioecious, small, in axillary cymes forming usually terminal panicles; calyx 4–5-toothed,

corolla tubular or funnelform, with 4–5 small valvate crisped lobes; stamens included; style deeply 2-parted, twisted; ovary 2-celled; cells 1-ovuled: fr. dry, the exocarp fragile, breaking away and freeing the 2 compressed nutlets. (Latin *paedor*, bad smell; referring to the foliage when bruised.) About 20 species in trop. and subtrop. Asia and Am.

P. chinénsis Hance. Deciduous shrub climbing to 5 m., emitting a disagreeable odor when bruised: lvs. ovate to ovate-lanceolate, 5–12 cm. long, acuminate, rounded or truncate, rarely subcordate or cuneate, dark green above, lighter green beneath and pubescent or nearly glabrous; petiole 1–5 cm. long: fls. in axillary cymes forming long terminal panicles; corolla 1–1.5 cm. long, 4–6 mm. across, scurfy-pubescent and whitish outside, with purple eye: fr. globose, 5–6 mm. across, orange. Fl.VII–VIII; fr.IX–X. N.K.14:t.21. N.T.1:398. R.H.1919:298. M.O.281. (*P. tomentosa* Maxim., not Bl., *P. foetida* Thunb., not L., *P. Wilsonii* Hesse.) China, Japan, Korea. Intr. 1907. Zone VI or VII.—Of little ornamental merit.

3. **LEPTODÉRMIS** Wall. Deciduous shrubs: lvs. opposite, entire, with triangular interpetiolar stipules: fls. heterostylous, in axillary head-like bracted clusters; calyx 5-toothed, persistent; corolla tubular-funnelform, with spreading 5-lobed limb; stamens 5; style 5-parted at apex; either style or stamens exserted; ovary 5-celled, cells 1-ovuled: fr. a caps., the outer wall splitting into 5 valves, the inner wall net-like, closed, enveloping the seeds. (Greek *leptos*, thin, and *derma* skin; referring to the inner wall of the fr.) About 30 species in E. Asia and the Himal.

L. oblónga Bge. Shrub to 1 m.; brts. finely pubescent: lvs. elliptic-ovate to oblong, 1–2 cm. long, acute, narrowed into a short petiole, usually scabrid above, sparingly pubescent beneath, with 3–5 pairs of veins: fls. in sessile few-fld. clusters; bractlets connate to the middle, longer than calyx; corolla violet-purple, with slender tube 1.5–1.8 cm. long, pubescent outside, hairy in throat, lobes oblong-lanceolate. Fl.VII–X. N. China. Intr. 1905. Zone V. —Interesting small shrub with attractive fls. late in summer and autumn.

Closely related species are: **L. Rehderiàna** Winkl. Slender shrub; brts. pilose with long white hairs: lvs. sparingly pilose above and beneath, chiefly on midrib; corolla slenderer and more densely pubescent; bractlets connate to near apex. China. Intr. 1914.—**L. pilòsa** Diels. Lvs. ovate, 1–2.5 cm. long, pilose; lower stipules long-pointed: fls. lilac, in dense axillary and terminal clusters; calyx-lobes short, subtruncate; corolla 1 cm. long, tomentulose outside, with suberect short lobes. C. and W. China. Cult. 1924.—**L. kumaonénsis** Parker. Lvs. ovate to ovate-lanceolate, 3–5 cm. long, with 6–9 pairs of veins: fls. on very short lateral brts. in small clusters. N. W. Himal. Intr. 1923.—**L. pulchélla** Yatabe. Glabrous or nearly glabrous: bractlets connate to near apex. N.T.1:400. Tokyo Bot. Mag. 4:t.12. Japan. Cult. 1905 in Japan.

4. **COPRÓSMA** Forst. Evergreen procumbent or upright shrubs or small trees: lvs. opposite, rarely whorled, with interpetiolar stipules: fls. usually dioecious, rarely bisexual, small, white or greenish; calyx campanulate and slightly toothed; corolla funnelform or campanulate, 4–9-lobed; stamens 4–9 inserted at base of tube, exserted; style 2-parted to base, pubescent; ovary 2-, rarely 4-celled, cells 1-ovuled: fr. an ovoid or globose drupe. (Greek *kopros*, dung, and *osme*, odor; referring to the fetid odor of the plant.) About 60 species in New Zealand and Australia, 1 in Chile.

C. Pétriei Cheesem. Prostrate and creeping, forming patches to 8 cm. high: lvs. linear-oblong to obovate, 3–6 mm. long, hairy and ciliate, rigid and thickish: fls. solitary at end of short brts.; staminate with 4-lobed corolla and without calyx; pistillate fls. with irregularly lobed corolla and with calyx:

fr. globose, bluish purple, 8–12 mm. across. M.G.30:365(h). New Zeal. Intr. about 1910. Zone VII or VIII.—Attractive in fr.; suitable for the rock-garden.

A related species is **C. acerôsa** A. Cunn. Prostrate; brts. puberulous: lvs. linear, 6–15 mm. long, dark green, glabrous; staminate fls. in clusters of 1–4, pistillate solitary: fr. globose, pale blue, 6–8 mm. across. Cheesemann, Ill. New Zeal. Fl. t.84. New Zeal. Intr. about 1890.

5. **MITCHÉLLA** L. PARTRIDGE-BERRY. Evergreen trailing subshrub or herb, glabrous: lvs. opposite, short-petioled, with minute stipules: fls. in short-peduncled pairs, their ovaries united, heterostylous, either style or stamens exserted; calyx 4-toothed; corolla funnelform, with 4 spreading recurved lobes bearded inside; stamens inserted on throat; ovary 4-celled, cells 1-ovuled; stigma 4-lobed: fr. a berrylike united drupe crowned by the 2 persistent calyxes, with usually 8 roundish nutlets. (After John Mitchell, botanist in Virginia, a correspondent of Linnaeus; died in 1772.) One species in N. Am.

M. rèpens L. Stems slender, rooting, to 30 cm. long, glabrous or slightly pubescent: lvs. petioled, orbicular-ovate, 6–20 mm. long, obtuse, subcordate or rounded, dark green and lustrous above, often variegated with whitish lines: corolla 1–1.2 cm. long, white, often tinged purple, fragrant; fr. globose, scarlet, broader than high, 5–8 mm. across. Fl.VI–VII; fr.IX(–III). L.B.979(c). B.B.3:255. N. S. to Ont. and Minn., s. to Fla., Ark. and Tex. Intr. about 1761. Zone III or II?—Var. **leucocárpa** Bissell. Fr. white.—Attractive little plant for the rock-garden.

Fam. 110. CAPRIFOLIACEAE Vent. HONEYSUCKLE FAMILY

Shrubs or sometimes small trees, rarely herbs: lvs. opposite, simple or pinnate, normally without stipules: fls. bisexual, regular or irregular; calyx 4–5-toothed; corolla 4–5-lobed, tubular to rotate; stamens 5, sometimes 4, inserted on the tube: ovary inferior, 1–5-, rarely to 8-celled, each cell with 1 to many ovules; style 1 or wanting: fr. a berry or berry-like drupe, or an achene or a dehiscent caps.—Thirteen genera and about 400 species chiefly in the n. temp. zone, few on the mts. in the Tropics and in the s. hemisphere.

A. Corolla rotate, with regular limb (rarely tubular and fr. a 1-seeded drupe); style short or wanting.
  B. Lvs. pinnate: fr. berry-like, 3–5-seeded ..... 1. *Sambucus*
  BB. Lvs. simple, sometimes lobed: fr. a 1-seeded drupe ..... 2. *Viburnum*
AA. Corolla tubular to campanulate, limb often irregular; style elongated.
  B. Cells of ovary partly sterile, the fertile one 1-ovuled; stamens 4–5.
    C. Fr. a berry-like 2-seeded drupe; corolla regular; stamens 4–5, equal or subequal; ovary 4-celled, 2 cells sterile ..... 3. *Symphoricarpus*
    CC. Fr. an achene; stamens 4, didynamous.
      D. Ovary enclosed between 2 large bracts, 4-celled; corolla 2-lipped; 2 cells sterile. 4. *Dipelta*
    DD. Ovary not enclosed between bracts, 3-celled.
      E. Ovary and fr. elongated, narrow; sepals 2–5, persistent, enlarged in fr.: fls. solitary, in cymes or sometimes in pairs ..... 5. *Abelia*
    EE. Ovary and fr. ovoid or globose-ovoid, glandular or bristly: fls. in pairs.
      F. Fl.-pairs on a long terminal peduncle; trailing subshrub ..... 6. *Linnaea*
      FF. Fl.-pairs axillary forming terminal corymbs: upright shrub ..... 7. *Kolkwitzia*
  BB. Cells of ovary all fertile, 2–many-ovuled; stamens 5.
    C. Fr. a dehiscent caps., 2-celled; corolla nearly regular ..... 8. *Diervilla*
    CC. Fr. a berry.
      D. Ovary 2–3-, rarely 4–5-celled: fls. in pairs or in whorls; corolla usually 2-lipped. 9. *Lonicera*
      DD. Ovary 5(–8)-celled: fls. in whorls; corolla nearly regular ..... 10. *Leycesteria*

1. **SAMBŬCUS** L. ELDER. Deciduous shrubs or small trees, rarely herbs, with stout pithy brs.; winter-buds with several pairs of scales: lvs. opposite, odd-pinnate; lfts. serrate; with or without stipules and stipels: fls. small,

white, in terminal compound corymbs or panicles, 5-merous, rarely 3–4-merous; calyx-limb minute or nearly obsolete; corolla rotate, with ovate to oblong-lanceolate lobes; stamens with short filaments; ovary 3–5-celled; style short, 3–5-lobed: fr. a berry-like drupe with 3–5 1-seeded nutlets. (Ancient Latin name of the Elder.) About 20 species in temp. and subtrop. regions of both hemispheres.—*Sambucus Ebulus* L., *S. Schweriniana* Rehd. and *S. chinensis* Lindl. (*S. javanica* Hemsl., not Reinw.) are herbaceous and not included in the following account.

A. Cyme flat umbel-like; pith white: fr. black or dark purple, rarely whitish or greenish. Sect. Eusambucus Spach.
  B. Fr. not glaucous.
    C. Lfts. usually 5: fr. black; brts. strongly lenticellate.....1. *S. nigra*
    CC. Lfts. usually 7: fr. dark purple: brts. slightly lenticellate.....2. *S. canadensis*
  BB. Fr. glaucous.....3. *S. coerulea*
AA. Cyme paniculiform, with opposite or alternate brs.: pith usually brown. Sect. Botryosambucus Spach.
  B. Fr. black, rarely reddish brown; cyme corymbiform, about as broad as high. 4. *S. melanocarpa*
  BB. Fr. scarlet or red, rarely yellow.
    C. Infl. corymbiform, about as broad as high, its brs. ascending: pith at first white or very light brown.....5. *S. microbotrys*
    CC. Infl. paniculiform, ovoid, its brs. spreading or reflexed: pith brown.
      D. Cyme compact, its lower brs. usually reflexed, 5 mm. or less long: plant glabrous. 6. *S. racemosa*
      DD. Cymes rather loose, its lower brs. spreading, 5–15 mm. long.
        E. Plant more or less pubescent or puberulous: lfts. rather coarsely serrate: fr. 4–5 mm. across.....7. *S. pubens*
        EE. Plant glabrous: lfts. closely and more finely serrate, long-acuminate: fr. about 3 mm. across.....8. *S. Sieboldiana*

1. S. nígra L. European E. Large shrub or tree to 10 m., with deeply furrowed bark; brts. gray, strongly lenticellate: lfts. 3–7, usually 5, short-stalked, elliptic to elliptic-ovate, 4–12 cm. long, acute, sharply serrate, dark green above, lighter and sparingly hairy on the vein beneath, of disagreeable odor when bruised: fls. yellowish white, of heavy odor, in 5-rayed flat cymes, 12–20 cm. across; ovary usually 3-celled: fr. lustrous black, 6–8 mm. across. Fl.v–vi; fr.viii–ix. R.I.12:t.730(c). S.E.4:t.637(c). M.D.1920:213(h). G.W.19:345(h). Eu., N. Afr., W. Asia. Cult. since ancient times. Zone V.—Var. **albo-variegàta** West. Lvs. variegated with white. S.O.3:t.144a(c) J.L.33:f.47(h).—Var. **aureo-variegàta** West. Lvs. variegated with yellow.—Var. **aûrea** Sweet. Lvs. golden yellow. G.W.2:565.—Var. **laciniàta** L. Lfts. regularly and deeply dissected. S.O.3:t.144b(c,l). R.I.13:730,f.1436 (c,l). S.H.2:f.408a(l).—Var. **heterophýlla** Endl. Lfts. irregularly cut and erose, partly reduced almost to the midrib.—Var. **rotundifòlia** Endl. Lfts. broad-ovate to suborbicular, usually 3. S.H.2:f.408b(l).—Var. **víridis** West. Fr. greenish. S.O.3:t.143a(c). M.D.1909:8,t,f.2(c). (Var. *chlorocarpa* Hayne.)—Var. **alba** West. Fr. whitish. (Var. *leucocarpa* Hayne.)—Var. **pyramidàlis** Jaeg. Of upright columnar habit.—Var. **péndula** Dipp. Prostrate or with pendulous brs.

S. n. × *coerulea* = *S. fontenaysii;* see under No. 4.

2. **S. canadénsis** L. American E. Stoloniferous shrub to 4 m.; brts. pale yellowish gray, slightly lenticellate: lfts. usually 7, short-stalked, elliptic to lanceolate, 5–15 cm. long, acuminate, sharply serrate, bright green, slightly puberulous on the veins beneath or nearly glabrous: fls. white, in 5-rayed, slightly convex cymes, to 25 cm. across; ovary usually 4-celled: fr. purple-black, 4–5 cm. across. Fl.vi–vii; fr.ix. M. Am.1:t.75(c). B.C.6:3068,t. Gg.6:88(h). M.G.14:169(h). M.D.1909:36a(h). N. S. and Man. to Fla. and Tex. Intr. 1761. Zone IV.—Var. **aûrea** Cowell. Lvs. golden-yellow: fr. cherry-red. F.E.22:433. (Var. *delicatissima* Schwerin.)—Var. **máxima**

Schwerin. Lvs. larger; cymes to 35 cm. across; a very vigorous form. G.M. 51:451. G.W.11:397(h). S.L.378(h).—Var. **acutíloba** Ellw. & Barry. Lfts. much dissected, the lower ones pinnatifid, the upper ones incisely serrate and narrow. F.S.R.1:151. (Var. *laciniata* Cowell, not Gray.)—Var. **chlorocárpa** Rehd. Fr. greenish; lvs. pale green.—Var. **submóllis** Rehd. Lfts. beneath grayish green and soft-pubescent. Ill. to Ark. and Tex.

3. **S. coerùlea** Raf. Large shrub or small tree occasionally to 15 m.; brts. rather slender, bloomy when young: lfts. 5–7, oblong to oblong-lanceolate, 6–15 cm. long, coarsely serrate, bright green, glabrous: fls. yellowish white, in convex 5-rayed cymes, 10–15 cm. across: fr. blue-black, whitened by a heavy bloom. Fl.VI–VII; fr.VIII–IX. S.S.5:t.222. Gs.1:183;5:181,t(c). B. C. to Calif., e. to Mont. and Utah. Cult. 1850.—Var. **neo-mexicàna** Rehd. Lfts. 3–5, narrow-lanceolate, grayish green, slightly pubescent beneath. (*S. intermedia* Carr., *S. n.* Wooton.) Ariz. and N. Mex. Cult. 1875. Zone V. —Var. **velutìna** Schwerin. Young brts. and lvs. densely short-pubescent. (*S. v.* Durand, *S. californica* K. Koch.) Calif. Intr. before 1870. Zone VII ? —Handsome shrub, particularly when covered with its bluish white frs.

S. c. × *nigra* = **S. fontenaỳsii** Carr. Intermediate between the parents: lvs. bluish green: fr. black, bloomy. Orig. before 1870.

4. **S. melanocárpa** Gray. Shrub to 4 m.; brs. red-brown; pith white or light brown at first, darker the 2d year: lfts. 5–7, short-stalked, oblong-lanceolate, 8–15 cm. long, long-acuminate, coarsely serrate, dark green, pubescent beneath when young, later glabrate: fls. yellowish white, in a broad-ovoid to hemispherical cyme 5–7 cm. across and about as high, its brs. often alternate: fr. 6 mm. across; nutlets rugulose. Fl.VII–VIII; fr.VIII–IX. I.T.5: t.173. G.F.10:135. M.D.1909:8,t,f.4(c),45. B. C. to Idaho and Calif. Intr. 1894. Zone V.—Var. **Fuerstenbérgii** Schwer. Fr. reddish brown. Intr. 1903.

5. **S. micróbotrys** Rydb. Low shrub, rarely to 2 m.; bark light brown; pith white, at least at first: lfts. 5–7, subsessile or short-petioled, ovate-lanceolate, 5–10 cm. long, long-acuminate, sharply and rather coarsely serrate, light green, glabrous: fls. whitish, in short, nearly hemispherical cymes about 5 cm. high and as broad: fr. scarlet or orange-red, 4 mm. across, nutlets finely rugulose. Fl.VI–VII; fr.VIII–IX. M.D.1909:44. Calif. to Nev. and Colo. Cult. 1900. Zone V.

Related species are: **S. callicárpa** Greene. Taller and larger: lfts. pubescent along the midrib: cymes larger. M.D.1909:8,t,f.5(c).45. (*S. racemosa* var. *c.* Jeps.) Calif., Ore. Intr. about 1900.—**S. Williâmsii** Hance. Brs. with blue-colored rings above and below each joint: lfts. 5–7, stalked, elliptic or elliptic-ovate to elliptic-oblong, 6–14 cm. long, coarsely and incisely toothed, abruptly acuminate, glabrous: infl. broad-ovoid, with ascending brs. N. China. Intr. ?—**S. latipínna** Nakai. Lfts. 3–5, broad-elliptic: infl. hemispherical. N.K.11:t.2. Korea. Intr. ?

6. **S. racemòsa** L. European Red E. Shrub to 4 m.; brs. light brown; young brts. and lvs. glabrous: lfts. 5–7, subsessile, ovate or elliptic to ovate-lanceolate, 4–8 cm. long, acuminate, sharply and rather coarsely serrate: fls. yellowish white in a dense ovoid or oblong-ovoid panicle 3–6 cm. long, its lower brs. usually reflexed with stalks 5 mm. or less long: fr. scarlet, about 5 mm. across; nutlets finely rugulose. Fl.IV–V; fr.VI–VII. R.I.12:t.731(c). F.D.28:t.2909(c). S.O.3:t.141(c). Eu., W. Asia. Cult. 1596. Zone IV.—Var. **plumòsa** Carr. Lfts. incisely serrate to about the middle, with long and narrow teeth, purplish when unfolding. S.H.2:f.410b(l).—Var. **plumòso-aùrea** Wezelenburg. Lfts. like in the preceding, but golden yellow.—Var. **laciniàta** W. Koch. Lfts. regularly and deeply dissected, green when unfolding. (Var. *serratifolia* Hort.) R.I.12:t.731,f.1438(l,c).—Var. **tenuifòlia** Carr. Lfts. finely and deeply dissected, with very narrow segments, purplish when unfolding.

—Var. **ornàta** Carr. The first lvs. like those of var. *plumosa*, the later ones like those of var. *tenuifolia*. (Var. *pteridifòlia* Carr.)—Var. **purpùrea** Sweet. Fls. purplish or pinkish outside, purple in bud. (Var. *rosiflòra* Carr.)—Var. **flavéscens** Sweet. Fr. yellow or sometimes with red cheek. M.D.1909:8,t.f. 6(c). (Var. *xanthocarpa* Zabel.)—Attractive in fr. and some of the vars. with handsome foliage.

A closely related species is **R. kamtschática** E. Wolf. Lower: lfts. elliptic, rounded and usually acuminulate at apex, finely serrate: infl. pubescent, usually broader than high; petals much longer than calyx-tube, dentate. M.D.1923:32,f. 1–3,33,f.1. Kamtchatka. Cult. 1923.

7. **S. pùbens** Michx. RED-BERRIED E. Shrub to 4 or sometimes to 8 m.; brts. pale yellow-brown; brts. and lvs. finely pubescent when young: lfts. 5–7, stalked, ovate-oblong to oblong-lanceolate, 5–10 cm. long, serrate, pubescent beneath or sometimes finally glabrous: infl. ovoid or pyramidal, to 10 cm. long, rather loose, its lower brs. spreading with stalks 5–15 mm. long: fr. scarlet, about 5 mm. across; nutlets rugulose. Fl.v; fr.VI–VII. M.N.II.2: t.21(c). B.B.3:268. M.D.1909:44. (*S. racemosa* Gray, not L., *S. rac.* var. *p.* S. Wats.) N. B. to Minn., s. to Ga. and Colo. Intr. 1812. Zone IV.—Var. **dissécta** Britt. Lfts. deeply and regularly dissected. (*S. rac.* var. *laciniata* Rob. & Fern., not Koch.)—Var. **leucocárpa** Bernh. Fr. white. (*S. p. albicocca* Britt.)—Var. **xanthocárpa** Nieuwl. Fr. amber-yellow. (*S. rac. xanthocarpa* Cock., *S. r.* var. *chrysocarpa* Eames & Godfr.)—Handsome shrub with attractive scarlet fr.

The western form may possibly be separated as **S. leiospérma** Leib. Brts., lvs. and infl. glabrous or nearly glabrous; nutlets faintly rugulose or nearly smooth. G.F.10:174. S.M.886. (*S. callicarpa* Sarg., not Greene, *S. pubescens* var. *dimidiata* Schwer.) Alaska to Wash. and Wyo. Intr. 1904.

8. **S. Sieboldiàna** Graebn. Shrub or small tree to 6 m.: brts. light brown, glabrous when young: lfts. usually 7, on shoots sometimes 11, oblong to oblong-lanceolate, 6–20 cm. long, long-acuminate or caudate, sharply and closely serrate, nearly plane above, glabrous: fls. yellowish white, small, in ovoid panicles about 7 cm. long and 5 cm. across, its brts. often slightly reflexed; fr. scarlet, 3–4 mm. across, nutlets rugulose. Fl.IV–V; fr.VI–VII. S.I.2:t.74(c). N.T.1:418, 419. M.D.1920:206(1). (*S. racemosa* Shiras., not L., *S. rac.* var. *S.* Miq.) Japan, China. Intr. 1907. Zone V?

2. **VIBÚRNUM** L. Deciduous or sometimes evergreen shrubs or small trees; winter-buds naked or scaly: lvs. opposite, rarely whorled, entire, dentate or lobed, exstipulate or sometimes with small stipules adnate to the petiole: fls. small, white or pinkish, in umbel-like or paniculate compound cymes; calyx minutely 5-toothed; corolla rotate to campanulate or tubular, 5-lobed; stamens 5; ovary 1-celled: fr. a drupe with a 1-seeded usually compressed stone. (The ancient Latin name of *V. Lantana*.) About 120 species in N. and C. Am., in Eu., N. Afr. and in Asia s. to Java.—Many species are highly ornamental with showy fls. and attractive frs.

Lvs. not lobed, penninerved, sometimes 3-nerved at base.

A. Cyme paniculate, pyramidal to subglobose, its brs. opposite.
  B. Corolla tubular.
    C. Fls. before the lvs.; panicle 3–5 cm. long ..... 1. *V. fragrans*
    CC. Fls. after the lvs.: panicles 6–12 cm. long ..... 2. *V. erubescens*
  BB. Corolla rotate.
    C. Lvs. acuminate, with 5–7 pairs of veins ..... 3. *V. Henryi*
    CC. Lvs. rounded or acute, with 7–10 pairs of veins ..... 4. *V. Sieboldii*
AA. Cyme umbel-like, flat (globose in the snowball forms of Nos. 15, 17 and 44).
  B. Winter-buds naked; shrubs with stellate tomentum.
    C. Infl. without enlarged and sterile marginal fls.
      D. Lvs. dentate or denticulate, deciduous.
        E. Veins of lvs. straight, ending in the teeth.

FF. Corolla salver-shaped, with a tube nearly 1 cm. long.....5. *V. Carlesii*
FF. Corolla rotate or wide-funnelform.
G. Corolla-lobes shorter than tube; cymes usually with 5 rays.
6. *V. cotinifolium*
GG. Corolla-lobes longer than tube; cymes usually 7-rayed.
H. Calyx stellate-tomentose: lvs. remotely toothed.....7. *V. Veitchii*
HH. Calyx glabrous or slightly stellate-pubescent: lvs. closely denticulate.
8. *V. Lantana*
EE. Veins of lvs. anastomosing before reaching the margin, rarely partly ending in the teeth.
F. Corolla rotate or rotate-campanulate.
G. Lvs. usually obtuse: fls. mostly on rays of the 3d order; ovary glabrous.
9. *V. shensianum*
GG. Lvs. usually acute: fls. mostly on rays of the 2d order; ovary pubescent.
10. *V. burejaeticum*
FF. Corolla with cylindric tube, much longer than limb.
G. Lvs. obtuse, pubescent.....11. *V. mongolicum*
GG. Lvs. acuminate, nearly glabrous.....12. *V. urceolatum*
DD. Lvs. entire or sometimes obscurely and remotely denticulate, evergreen: corolla rotate.
E. Lvs. smooth above, 3–6 cm. long.....13. *V. utile*
EE. Lvs. rugose above, 10–18 cm. long.....14. *V. rhytidophyllum*
CC. Infl. with sterile and enlarged marginal fls.
D. Lvs. rounded at base; veins anastomosing before reaching the margin.
15. *V. macrocephalum*
DD. Lvs. cordate at base; veins straight, ending in the teeth.....16. *V. almifolium*
BB. Winter-buds scaly with 1 or 2 pairs of scales.
C. Cymes with enlarged sterile marginal fls.: veins of lvs. straight, ending in the teeth: tomentum stellate.....17. *V. tomentosum*
CC. Cymes without sterile fls.: tomentum not stellate.
D. Veins of lvs. curving and anastomosing before reaching the margin.
E. Lvs. deciduous: stone compressed, with solid albumen.
F. Cyme peduncled.
G. Lvs. usually entire: peduncle as long or longer than cyme...18. *V. nudum*
GG. Lvs. usually denticulate: peduncle shorter than cyme...19. *V. cassinoides*
FF. Cyme sessile: lvs. finely and sharply serrate.
G. Petiole with broad wavy margin: brs. slender.....20. *V. Lentago*
GG. Petiole with narrow, not wavy margin: brs. rather rigid.
H. Winter-buds and petioles rusty-tomentose.....21. *V. rufidulum*
HH. Winter-buds and petioles not rusty-tomentose.....22. *V. prunifolium*
EE. Lvs. evergreen: stone not compressed, ruminate.
F. Corolla rotate: lvs. 3-nerved at base.....23. *V. Davidi*
FF. Corolla cylindric-campanulate: lvs. not 3-nerved.....24. *V. cylindricum*
DD. Veins of lvs. straight, ending in the teeth.
E. Fr. red; stone flattened.
F. Petiole without stipules.
G. Lvs. evergreen, glabrous.....25. *V. japonicum*
GG. Lvs. deciduous.
H. Lvs. 3-nerved at base, 2–8 cm. long.....26. *V. foetidum*
HH. Lvs. not 3-nerved, usually larger.
I. Lvs. glabrous or pubescent only on veins beneath.
J. Lvs. generally ovate-oblong, broadest below the middle: stamens as long or shorter than corolla.....27. *V. theiferum*
JJ. Lvs. at least partly broadest above the middle: stamens longer than corolla.....28. *V. Wrightii*
II. Lvs. pubescent on both sides, broad.....29. *V. dilatatum*
FF. Petiole with subulate stipules.
G. Petiole 1–3 cm. long.
H. Lvs. glabrous or pubescent only on the veins beneath.
I. Corolla glabrous outside.
J. Cymes short-stalked, large and loose: lvs. usually rhombic-ovate.
30. *V. betulifolium*
JJ. Cymes long-stalked: lvs. broad-ovate or obovate..31. *V. lobophyllum*
II. Corolla villous outside .....32. *V. dasyanthum*
HH. Lvs. pubescent on both sides.....33. *V. hupehense*
GG. Petiole 3–6 mm. long.....34. *V. erosum*
EE. Fr. blue-black, scarcely flattened or flattened in Nos. 38–39.
F. Fr. globose-ovoid, with a deep groove on one side, round on back: petioles usually without stipules.
G. Lvs. with 7–11 pairs of prominent veins and with acute teeth: 2-year-old brs. gray or grayish brown, smooth.
H. Brts. glabrous: lvs. glabrous except bearded in the axils of the veins beneath.....35. *V. dentatum*
HH. Brts. slightly pubescent and lvs. pubescent, sometimes slightly so beneath
36. *V. pubescens*
GG. Lvs. with 5–7 pairs of veins, less prominent and with usually obtusish teeth, pubescent like the young brts.; brs. red-brown, usually rough.
37. *V. scabrellum*

FF. Fr. ellipsoid; stone flattened, with grooves on both sides; petioles with stipules.
G. Petiole 2–12 mm. long: lvs. rounded to subcordate at base: bark close. 38. *V. affine*
GG. Petiole 1.5–3 cm. long; lvs. deeply cordate: bark exfoliating. 39. *V. molle*

Lvs. palmately 3–5-nerved at base, lobed, rarely not lobed; petioles stipulate.
A. Fr. purple-black; stone grooved; cymes with all the fls. perfect, on elongated upright brs. 40. *V. acerifolium*
AA. Fr. scarlet or orange-red; stone not or scarcely grooved; cymes on short lateral brts.
B. Cyme without sterile marginal fls.: petiole not glandular.
C. Lvs. shallowly 3-lobed or undivided, 5–8 cm. long. 41. *V. pauciflorum*
CC. Lvs. deeply 3–5-lobed, 2–5 cm. long. 42. *V. kansuense*
BB. Cymes with enlarged sterile marginal fls.; petiole with glands near apex.
C. Anthers yellow; bark of stems thin.
D. Petiole with a shallow groove and small glands: lvs. usually glabrous. 43. *V. trilobum*
DD. Petiole with a narrow groove and large disk-like glands: lvs. pubescent beneath. 44. *V. Opulus*
CC. Anthers purple, rarely yellow: bark of stems thick and slightly corky: upper lvs. usually with elongated entire middle lobe . . 45. *V. Sargenti*

Sect. I. THYRSOSMA Rehd. Petiole without stipules; cymes paniculate, with opposite brs.: drupe ovoid to ellipsoid, blue-black or purple; stone slightly compressed, with a deep ventral furrow; albumen solid or ruminate.

1. **V. frágrans** Bge. Shrub to 3 m.; brts. slightly pubescent; brs. brown: lvs. elliptic, 4–7 cm. long, acute, broad-cuneate or cuneate, serrate with triangular teeth, sparingly pubescent above and pubescent on veins beneath, finally glabrous or nearly so, with 5–6 pairs of veins and the veinlets impressed above and below, thickish; petiole 1–1.5 cm. long, purplish: panicle 3–5 cm. long, glabrous or nearly so; corolla salver-shaped, white, pinkish in bud, tube about 8 mm. long, limb spreading about 1 cm. across; stamens inserted above the middle, unequally high. Fl.IV–V. Gn.85:118;88:221. G.C.III.69: 109. Farrer, Eaves of World,1:94,t(h). N. China. Intr. 1915. Zone V?— The very fragrant and conspicuous fls. appear before the lvs.

A closely related species is **V. grandiflòrum** Wall. Shrub to 2 m.: lvs. elliptic-oblong, 6–9 cm. long, acuminate, pubescent beneath on the veins and in their axils, pairs of veins 7–8: panicle short and dense, pubescent: corolla-tube over 1 cm. long; stamens inserted at and below the middle. B.M.9063(c). (*V. nervosum* Hook. f. & Thoms., not D. Don.) Himal. Intr. 1914. Zone VII?

2. **V. erubéscens** Wall. Deciduous shrub or small tree: lvs. elliptic or ovate to oblong, 5–10 cm. long, acuminate, cuneate or rounded at base, pubescent on the veins beneath or glabrous, with 5–7 pairs of veins; petiole 1–2.5 cm. long: panicle loose, pendulous, 4–8 cm. long, slightly pubescent or glabrate, on a peduncle 2–6 cm. long; corolla white, tinged with pink, about 1 cm. long, with spreading round lobes: fr. broad-ellipsoid, 6 mm. long, first red, then black. Wallich, Pl. As. Rar.2:t.134(c). Himal., W. China. Only the following var. is in cult.—Var. **gracílipes** Rehd. Lvs. usually elliptic, rounded at base, glabrous or nearly so: infl. loose, 7–12 cm. long: fls. partly slender-pediceled. Fl.VI; fr.IX. C. China. Intr. 1910. Zone (V) or VI.— Handsome species very distinct on account of its pendulous panicles.

3. **V. Hénryi** Hemsl. Evergreen or half-evergreen shrub or small tree to 3 m.; brts. stiff, glabrous: lvs. elliptic-oblong to oblong-obovate, 5–12 cm. long, acuminate, cuneate to rounded at base, shallowly toothed, lustrous dark green above, glabrous except sparingly stellate-pubescent on midrib beneath; petiole 1–2 cm. long: panicle broad-pyramidal, 5–10 cm. long: fls. about 6 mm. across: fr. ovoid, 6 mm. long, first red, then black. Fl.VIII. B.M.8393(c). S.T.2:t.116. B.S.2:649. G.C.III.48:264, 265,t(h);60:193(h). S.L.426(h). C. China. Intr. 1907. Zone VII or VIII.—An evergreen shrub especially handsome in fruit.

4. **V. Sieb̆óldii** Miq. Shrub to 3 m., often tree-like; brts. stout, pubescent when young: lvs. elliptic or obovate to oblong-obovate, 6–12 cm. long, acute

to rounded, broad-cuneate, coarsely crenate-serrate, dark lustrous green above, stellate-pubescent chiefly on the veins beneath, with 7–10 pairs of prominent veins; petiole 8–15 mm. long: panicle 7–10 cm. long and as broad; corolla rotate-campanulate, 8 mm. across, creamy white: fr. oblong-ovoid, 1 cm. long, changing from pink to blue-black. Fl.v–vi; fr.vii–ix. Add.5:t.178 (c) S.I.1:t.86(c). G.F.2:559. F.E.23:345. Japan. Cult. 1880. Zone V.—Var. **variegàtum** Meeh. Lvs. variegated with white.—Var. **reticulàtum** Rehd. Smaller in every part; lvs. glabrescent.—Handsome and vigorous shrub, with lustrous large foliage exhaling a disagreeable odor when bruised; very attractive in fl. and fr.

Sect. 2. Lantana Spach. Shrubs with stellate tomentum and naked winter-buds: lvs. deciduous, rarely persistent, usually denticulate: stone much flattened, with 3 ventral and 2 dorsal grooves sometimes obsolete; albumen solid.

5. **V. Carlèsii** Hemsl. Shrub to 1.5 m., with spreading brs.; young brts., petioles and infl. stellate-tomentose: lvs. broad-ovate to elliptic, 3–10 cm. long, acute, usually rounded at base, irregularly toothed, dull green and stellate-pubescent above, densely so and paler beneath; petiole 5–10 mm. long: fls. with the lvs., very fragrant, in dense hemispherical cymes 5–7 cm. across; corolla 1–1.4 cm. across, with a cylindric tube 6–10 mm. long, white, pink outside; stamens included, inserted above the middle, filaments shorter than anthers: fr. ellipsoid, 10 mm. long, blue-black. Fl.iv–v; fr.ix–x. B.M. 8114(c). G.C.III.43:346;45:340(h). B.S.2:644. Gn.84:154;88:222. J.L. 35:f.85(h). S.L.419(h). Korea. Intr. 1902. Zone V.—Shrub of broad round habit, valued for its very fragrant handsome early fls.

A closely related species is **V. bitchiuénse** Mak. A slenderer, more straggling shrub; lvs. smaller, usually obtuse, often subcordate: fls. in smaller cymes; anthers inserted below the middle; filaments longer than anthers. G.C.III.69:247. N.T.1: 427. (*V. Carlesii* var. *b.* Nakai. *V. C.* var. *syringiflorum* Hutchins.)—Less handsome than the preceding.

6. **V. cotinifòlium** D. Don. Shrub to 4 m., with spreading brs. stellate-tomentose when young: lvs. orbicular-ovate to ovate, 5–12 cm. long, obtuse or abruptly acuminulate, rounded or cordate, crenulate-dentate or nearly entire, grayish stellate-tomentose beneath, slightly so above and finally often glabrescent: cymes 5–8 cm. across; corolla funnelform-campanulate, about 6 mm. long, white, tinged pink: fr. ovoid, 8–10 mm. long, red, finally black. Fl.v; fr.ix. B.R.1650(c). G.F.5:245. G.W.13:141(h). (*V. multratum* K. Koch.) Himal. Intr. 1830. Zone (V) or VI.

7. **V. Veìtchii** C. H. Wright. Shrub to 2 m.; young brts. and petioles stellate-tomentose: lvs. ovate, 7–12 cm. long, acuminate, cordate or rounded at base, remotely dentate, sparingly stellate-pubescent above, densely so beneath: petiole 1–2.5 cm. long: fls. white, 6 mm. across, in dense short-stalked stellate-tomentose cymes 5–12 cm. across, on a peduncle 6–50 mm. long: fr. short-ellipsoid, 8 mm. long, red, finally black. Fl.v–vi; fr.ix. C. China. Intr. 1901. Zone V.—Handsome shrub.

A closely related species is **V. buddleifòlium** C. H. Wright. Shrub to 2 m.; lvs. oblong-lanceolate, 8–15 cm. long, rounded or subcordate at base, shallowly toothed, grayish stellate-tomentose beneath: cyme about 8 mm. across; corolla 8 mm. across. C. China. S.H.2:f.419i(l). Intr. 1900. Zone (V).

8. **V. Lantàna** L. Wayfaring-tree. Upright shrub sometimes to 5 m. tall and tree-like; brts. scurfy-pubescent: lvs. ovate to oblong-ovate, 5–12 cm. long, acute or obtuse, cordate to rounded at base, rather closely denticulate, sparingly stellate-pubescent and wrinkled above, stellate-tomentose beneath; petiole 1–3 cm. long: cyme 6–10 cm. across, stellate-pubescent: fr. ovoid-oblong, 8 mm. long, changing from red to black. Fl.v–vi; fr.vii–ix.

Add.4:t.148(c). R.I.17:t.120,f.1–2(c). A.G.18:453(as *V. lantanoides*). Gn. 61:324(h). Eu., W. Asia. Long cult. and occasionally escaped in the E. States. Zone IV.—Var. **variegàtum** Bull. Lvs. variegated with yellow.—Var. **rugòsum** Lange. With larger, more wrinkled lvs. and larger cymes.—Var. **díscolor** Huter. Lvs. smaller and of firmer texture, white-tomentose beneath. S.H.2: f.419n-o(l). (*V. maculatum* Pantoczek.)—Handsome ornamenral shrub with attractive fls. and frs.; the lvs. turning red in autumn.

9. **V. shensiànum** Maxim. Slender-branched shrub; young brts. stellate-pubescent: lvs. ovate-elliptic, 2–5 cm. long, obtuse or acutish, rounded at base, sometimes broad-cuneate, denticulate, dark yellow-green and sparingly pubescent or glabrous above, stellate-pubescent beneath, with 5–6 pairs of veins usually anastomosing, sometimes partly ending in the teeth; petiole 5–10 mm. long; cyme 5-rayed, 5–8 cm. across, stellate-pubescent on a stalk 5–25 mm. long, sometimes sessile; corolla rotate-campanulate, 6 mm. across; ovary glabrous; drupe short-ellipsoid, 8 mm. across, blue-black; stone with convex back. Fl.v–vi; fr.ix. S.T.2:t.140. N. W. China. Intr. 1910. Zone V.

10. **V. burejaèticum** Reg. & Herd. Shrub to 5 m.; young brts. stellate-pubescent, glabrous and light gray the 2d year: lvs. ovate or elliptic to elliptic-obovate, 4–10 cm. long, acute to obtuse, rounded or subcordate, sinuately denticulate, sparingly hairy above, sparingly stellate-pubescent beneath, chiefly on the veins, becoming glabrous; petiole 3–8 mm. long, scurfy-pubescent: fls. white, in dense 5-rayed usually pubescent cymes 4–5 cm. across: fr. ellipsoid to ellipsoid-oblong, 1 cm. long, bluish black; stone grooved on both sides. Fl.v; fr.ix. Gt.11:47,t. D.H.1:186. Manch., N. China. Cult. 1900. Zone V or IV.

11. **V. mongòlicum** Rehd. Shrub to 2 m., with spreading brs.; young brts. stellate-pubescent, glabrous and yellowish gray the 2d year: lvs. broad-ovate to elliptic, 3–6 cm. long, acute to obtuse, rounded at base, shallowly dentate, sparingly pubescent above, sparingly stellate-pubescent beneath; petiole 3–8 mm. long; cymes stalked, with rather few fls., 2–4 cm. across; fls. mostly on rays of the 1st order; corolla tubular-campanulate, 6–7 mm. long, with short, slightly spreading lobes; ovary glabrous: fr. ellipsoid, black. Fl.v; fr.ix. D.H.1:198. Bull. Soc. Nat. Mosc.37:t.1,f.2. (*V. davuricum* Pall.) E. Siberia, N. China. Intr. 1785. Zone V.

12. **V. urceolàtum** Sieb. & Zucc. Low straggling shrub to 1 m., with procumbent rooting stems; brts. glabrous or sparingly scurfy, becoming reddish or yellowish brown: lvs. ovate to ovate-lanceolate, 6–12 cm. long, acuminate, rounded at base, rarely broad-cuneate, crenate-serrate, glabrous above, scurfy on the veins beneath; petiole 1–2 cm. long, nearly glabrous: cymes usually 5-rayed, glabrous or nearly so, 3–6 cm. across, on long slender peduncles; corolla pinkish white, cylindric-campanulate, 3–4 mm. long, with short erect lobes; anthers exserted: fr. ovoid, 6 mm. long, black; stone much compressed, grooved on both sides. Fl.v; fr.ix. S.T.2:t.141. N.T.1:425. Japan. Intr. 1916. Zone V.—Very distinct species, but of little ornamental merit.

13. **V. ùtile** Hemsl. Evergreen shrub to 2 m., of open habit, with slender brs. stellate-pubescent when young: lvs. elliptic-ovate to ovate-oblong, 2–7 cm. long, obtuse, rarely acutish, broad-cuneate or rounded, entire, lustrous dark green above, whitish stellate-tomentose beneath with 5–6 pairs of veins elevated beneath; petiole 4–8 mm. long: fls. white, in dense stellate-pubescent 5-rayed cymes 5–8 cm. across: fr. broad-ellipsoid, 6–8 mm. long, bluish black.

Fl.v. B.M.8174(c). S.T.2:t.143. R.H.1919:264,t(c). S.L.424(h). C. China. Intr. 1901. Zone VII or VIII.

14. **V. rhytidophýllum** Hemsl. Evergreen shrub to 3 m., with stout upright brs. stellate-tomentose when young: lvs. ovate-oblong to ovate-lanceolate, 7–18 cm. long, acute or obtuse, rounded or subcordate at base, entire or obscurely denticulate, lustrous dark green, glabrous and strongly wrinkled above, prominently reticulate beneath and gray or yellowish tomentose; petiole 1–3 cm. long: fls. yellowish white, 6 mm. across, in stellate-tomentose cymes formed in autumn and remaining naked through the winter, 10–20 cm. across, 7–11-rayed, on a stout peduncle 2–4 cm. long; ovary pubescent: fr. short-ellipsoid, 8 mm. long, first red, then lustrous black. Fl.v–vi; fr.ix–x. B.M.8382(c). G.C.III.42:220;68:277(h). Gn.78:283(h). S.L.423(h). C. and W. China. Intr. 1900. Zone (V).—One of the most distinct and striking species with its bold lustrous foliage.

15. **V. macrocéphalum** Fort. Chinese Snowball. Deciduous or half-evergreen shrub to 4 m., with spreading brs. scurfy-pubescent at first: lvs. ovate or elliptic to ovate-oblong, 5–10 cm. long, acute or obtusish, rounded at base, denticulate, dark green and nearly glabrous above, stellate-pubescent beneath; petiole 8–20 mm. long: fls. white, about 3 cm. wide, in large globose heads 8–15 cm. across. Fl.v–vi. B.R.33:43(c). F.S.3:t.263(c). Gn.79:336(h);88:205(h). A.F.16:1547(h). Gn.M.30:8(h). China. Intr. 1844. Zone VII?—This is the type which may be distinguished as var. **stérile** Dipp. (*V. Fortunei* Hort.) from the wild form with only the marginal fls. sterile and enlarged: var. **Keteleèri** Nichols. R.H.1863:270. Gn.45:423. Cult. 1863. Zone (V).—The sterile form is a very showy plant with larger heads than the Japanese and the European Snowball.

Sect. 3. Pseudotinus Clarke. Deciduous shrubs with denticulate lvs. and stellate tomentum; winter-buds naked: cymes terminal, usually with radiant fls.: fr. purple-black; stone compressed, with a deep ventral furrow; albumen ruminate.

16. **V. alnifòlium** Marsh. Hobble-bush. Shrub to 3 m., with forked brs., sometimes procumbent and rooting; brts. scurfy-pubescent: lvs. in distant pairs, broad-ovate or suborbicular, 10–20 cm. long, short-acuminate, cordate, irregularly denticulate, stellate-pubescent above at first, later glabrous, more densely pubescent beneath, chiefly on the veins; petiole 3–6 cm. long, scurfy: fls. white, in sessile stellate-pubescent cymes 8–12 cm. across; sterile fls. 2–2.5 cm. wide; stamens as long as corolla-lobes: fr. broad-ellipsoid, 8 mm. long, first red, then purple-black. Fl.v–vi; fr.ix. L.B.1570(c). G.F.2:535. B.B. 3:269. (*V. lantanoides* Michx.—American Wayfaring-tree.) N. B. and Mich. to N. C.; in the mts. Intr. 1820. Zone IV.—Var. **praècox** Hesse. Fls. 3 weeks earlier. M.D.1912:370. G.W.16:495(h).—Handsome distinct shrub with large foliage turning deep claret-red in autumn; prefers half-shady and moist situations.

Closely related species are: **V. furcàtum** Bl. Of more upright habit; stamens about half as long as corolla; stone with the ventral furrow broader and more open. S.I.2:t.74(c). S.T.2:119. Japan. Intr. 1892. Zone V?—**V. sympodiàle** Graebn. Lvs. narrow-ovate to elliptic-ovate, rounded or suborbicular at base and more finely serrulate; petiole stipulate: cymes 6–9 cm. across. S.T.2:t.139. China. Intr. 1900? Zone V?

Sect. 4. Pseudopulus Dipp. Deciduous shrubs with dentate lvs. and stellate tomentum; winter-buds with 2 scales; cymes with radiant fls., on short lateral brts.: fr. blue-black; stone compressed, with broad ventral furrow; albumen solid.

17. **V. tomentòsum** Thunb. Shrub to 3 m., with almost horizontally spreading brs. stellate-tomentose when young: lvs. broad-ovate to oblong-ovate, sometimes elliptic-obovate, 4–10 cm. long, acute or abruptly acuminate,

rounded to broad-cuneate, dentate-serrate, dark green and nearly glabrous above, stellate-pubescent beneath, with 8–12 pairs of nearly straight veins; petiole 1–2 cm. long: cymes long-peduncled, stellate-pubescent, usually 7-rayed, 6–10 cm. across, with sterile marginal fls. about 3 cm. wide: fr. ellipsoid, red, then blue-black. Fl.v–vi; fr.viii–ix. S.Z.1:t.38(c). S.I.1:t.86(c). G.C.III.36:234. G.F.4:594. Gg.5:311(h). B.C.6:3458,t(h). (*V. plicatum* Miq., not Thunb.) Japan, China. Intr. about 1865. Zone V.—Var. **Marièsii** Veitch. Cymes and sterile fls. larger, otherwise not different from the type. Gn.88:222(h). J.L.27:863(h).—Var. **stérile** K. Koch. Japanese Snowball. All fls. sterile, pure white, forming globose cymes 6–8 cm. across: lvs. less pubescent. G.C.III.29:72(h). Gn.78:427(h),472(h);88:125(h). Gg.1:263(h). (Var. *plicatum* Maxim., var. *plenum* Rehd., *V. plicatum* Thunb.) Cult. in China and Japan. Intr. 1844.—Var. **rotundifòlium** Rehd. Much like the preceding form, but blooming about 2 weeks earlier and lvs. broader.—Var. **parvifòlium** Rehd. Lvs. elliptic to oblong, 3–5 cm. long, long-acuminate: dwarfer and of slower growth. (Var. *cuspidatum* Maxim.)—Var. **lanceàtum** Rehd. Similar to the preceding, but lvs. narrower, lanceolate on the shoots, more gradually acuminate, more pubescent beneath: infl. smaller, with fewer sterile fls. Intr. 1892.—Handsome and distinct shrub, with showy fls. and attractive frs. red before maturity; the lvs. changing to vinous red in autumn. The snowball form is one of the showiest shrubs.

Sect. 5. Lentago DC. Deciduous shrubs: lvs. entire or serrulate, with curving and anastomosing veins: winter-buds with 1 pair of scales: cymes without sterile marginal fls.: fr. blue-black or black; stone convex on back and with 3 shallow ventral grooves; albumen solid.

18. **V. nùdum** L. Smooth Withe-rod. Upright shrub, sometimes to 5 m.; brts. slightly scurfy: lvs. elliptic or ovate to obovate-elliptic or elliptic-lanceolate, 5–12 cm. long, acute or obtuse, broad-cuneate, entire or obscurely crenulate, slightly revolute, scurfy on both sides when young, glabrous above at length: fls. white or yellowish white, in cymes 6–12 cm. across, on slender stalks as long or longer than the cyme: fr. subglobose, about 8 mm. long, blue-black. Fl.vi–vii; fr.ix–x(–xii). B.M.2281(c). B.B.3:273. L. I. to Fla., w. to Ky. and La. Intr. 1752. Zone VI.—Var. **angustifòlium** Torr. & Gr. Lvs. smaller and narrower, more lustrous above and of firmer texture. (Var. *nitidum* Zabel, *V. anglicum* Hort.)

V. n. × *Lentago* = *V. Vetteri;* see under No. 20.

19. **V. cassinoìdes** L. Withe-rod. Upright shrub to 2 m., occasionally to 4 m., similar to the preceding species: lvs. elliptic or ovate to oblong, 3–10 cm. long, acute or bluntly acuminate, obscurely dentate or denticulate, dull green above, nearly glabrous: peduncle usually shorter than the cyme. Fl. vi–vii; fr.ix. Add.7:t.233(c). Em.2:411,t(c). G.F.9:305. S.L.425(h). Gn.M. 29:223(h). (*V. nudum* var. *c.* Torr. & Gr.—Appalachian Tea.) Nfld. to Man. and Minn., s. to N. C. Intr. 1761. Zone III or IV.

20. **V. Lentàgo** L. Sheep-berry. Shrub or small tree to 10 m., with slender brs.; brts. slightly scurfy: winter-buds gray, the terminal long-pointed: lvs. ovate to elliptic-obovate, 5–10 cm. long, acuminate, broad-cuneate to rounded at base, finely toothed, glabrous or scurfy on the veins beneath; petiole 1–2.5 cm. long, mostly winged with wavy margin: cymes 6–12 cm. broad, sessile: fr. ellipsoid, 1.2–1.5 cm. long, blue-black, bloomy. Fl.v–vi; fr. ix–x. S.O.3:t.176(c). G.O.t.102(c). S.S.5:t.223, 224. (Nanny-berry.) Hudson Bay to Man., s. to Ga. and Miss. Intr. 1761. Zone II or I.—Var. **sphaerocárpum** Gray. Fr. subglobose.—A handsome large, often arborescent shrub.

***V. L.* × *nudum* = V. Vêtteri** Zabel. Similar to No. 19, but lvs. more closely and distinctly denticulate and more distinctly acuminate, petioles below infl. narrowly winged. Orig. before 1879.— ***V. L.* × *prunifolium* = V. Jâckii** Rehd. Differing chiefly in the less acuminate lvs., more finely serrate, less pale beneath, in the less broadly winged petiole, the shorter winter-buds and denser habit. Orig. before 1900.

21. **V. rufídulum** Raf. Southern Black-haw. Large shrub or small tree to 10 m., with rather stout rigid brs.; winter-buds scarcely pointed, obtuse, like the young brts. and petioles rusty-pubescent: lvs. elliptic to elliptic-obovate, 5–10 cm. long, usually obtuse, serrulate, lustrous and glabrous above, rusty-pubescent beneath, chiefly toward the base: petiole usually narrowly winged, 6–12 mm. long: fls. pure white, in cymes 8–12 cm. across: fr. ellipsoid, dark blue, bloomy, 1.2–1.5 cm. long. Fl.v–vi; fr.ix–x. S.S.5:t.225(partly). S.M.890. (*V. rufotomentosum* Small., *V. ferrugineum* Small, *V. prunifolium* var. *ferrugineum* Torr. & Gr.) Va. to Fla., w. to Ill. and Tex. Intr. 1883. Zone V.—Handsome arborescent shrub with lustrous dark green lvs. and attractive fls. and frs.

22. **V. prunifòlium** L. Black-haw. Large shrub or small tree to 5 m., with rigid spreading brs.; winter-buds short-pointed, reddish pubescent; brts. glabrous: lvs. broad-elliptic to ovate, 3–8 cm. long, acute or obtuse, rounded at base or broad-cuneate, serrulate, glabrous or nearly so; petiole not or narrowly winged, 8–16 mm. long: fls. pure white, in sessile cymes 5–10 cm. across: fr. short-ellipsoid to subglobose, 8–12 mm. long, blue-black and bloomy. Fl.iv–v; fr.ix–x. Add.3:t.110(c). D.H.1:195. Gng.5:310(h). A.F.12:1100(h). (*V. pyrifolium* Poir.—Stag-bush.) Conn. to Fla., w. to Mich. and Tex. Intr. 1731. Zone V.—Handsome round-headed shrub with attractive fls. and frs.

V. p. × *Lentago* = *V. Jackii;* see under No. 20.

Sect. 6. Tinus Maxim. Evergreen usually glabrous shrubs: lvs. entire or obscurely toothed, often 3-nerved at base, with curving and anastomosing veins; petiole exstipulate; winter-buds with 1 pair of scales: corolla rotate: drupe subglobose to ellipsoid, blue or blue-black; stone without grooves; albumen ruminate.

23. **V. Davìdi** Franch. Evergreen compact shrub to 1 m.; brts. warty: lvs. elliptic to elliptic-obovate, 5–14 cm. long, short-acuminate, broad-cuneate to nearly rounded at base, distinctly 3-nerved, sometimes obscurely toothed, chiefly above the middle, dark green above, paler below, glabrous except axillary tufts of hairs beneath; petiole 6–25 mm. long: fls. dull white, in dense cymes 5–8 cm. across, on a stalk 1.5–3 cm. long; fr. ovoid or globose-ovoid, 6 mm. long, blue. Fl.vi; fr.ix–x. J.L.38:f.44. R.H.1926:69(h). Gn.86:633. G.C. III.72:225. W. China. Intr. 1904. Zone VII or VIII.—Compact evergreen shrub with attractive fr.

Related species are: **V. cinnamomifòlium** Rehd. Taller, sometimes tree to 6 m.: lvs. elliptic-oblong, 8–13 cm. long, 3-nerved, nearly entire, glabrous; cymes loose, 12–17 cm. across: fr. ovoid, 4 mm. long, blue-black, lustrous. S.T.2:t.119. W. China. Intr. 1904. Zone VIII?—**V. propínquum** Hemsl. Shrub with red-brown, lustrous brts.: lvs. elliptic or ovate to elliptic-oblong or ovate-lanceolate, 4–9 cm. long, acuminate, broad-cuneate, 3-nerved, remotely denticulate, lustrous above: fls. greenish white, in slender-stalked cymes 4–7 cm. across: fr. globose-ovoid, 5–6 mm. long. S.T.2:t.115. C. and W. China. Intr. 1901. Zone VIII.—**V. Harryânum** Rehd. Shrub to 3 m.; young brts. minutely stellate-tomentose: lvs. orbicular-ovate to obovate, 8–25 mm. long, obtuse, broad-cuneate, entire or obscurely toothed, dark dull green above, glabrous; cymes 3–3.5 cm. across: fr. ovoid, 4 mm. long, black. W. China. Intr. 1904. Zone VII or VIII.

Sect. 7. Megalotinus Maxim. Lvs. usually evergreen, entire or denticulate, penninerved with anastomosing veins; petiole exstipulate: corolla rotate or cylindric-campanulate; drupe blue-black or purple; stone compressed, with dorsal and ventral grooves; albumen usually solid; winter-buds with 1 pair of scales.

24. **V. cylíndricum** Buch.-Ham. Evergreen shrub or tree to 13 m.; brts. warty: lvs. elliptic to oblong, 8–18 cm. long, acuminate, cuneate, entire or remotely and obscurely toothed above the middle, dark dull green above and covered with a thin waxy layer, with 3–4 pairs of veins; petiole 1–3 cm. long: cyme usually 7-rayed, 8–12 cm. across, on a stalk 2–6 cm. long: corolla white, tubular-campanulate, 4–5 mm. long, with short erect lobes; anthers exserted, lilac: fr. ovoid, 4–5 mm. long; stone slightly compressed, with shallow grooves, 1 ventral and 2 dorsal. Fl.VII–IX; fr.X–XII. S.T.2:t.143. G.C.III.52:371. M.O.254(h). (*V. coriaceum* Bl.) W. China, Himal. Intr. 1881. Zone VII.—Very distinct on account of its small cylindric fls. and a handsome evergreen shrub.

Sect. 8. Odontotinus Rehd. Lvs. deciduous, rarely evergreen, dentate, with straight veins ending in the teeth, very rarely anastomosing, sometimes 3-nerved and lobed; petioles with or without stipules; corolla rotate: stone with 3 or 1 ventral and 2 often obsolete dorsal grooves: shrubs with fascicled pubescence or glabrous; winter-buds with 2 pairs of outer scales.

25. **V. japónicum** Spreng. Evergreen shrub to 2 m.; brts. glabrous: lvs. broad- or rhombic-ovate, 8–14 cm. long, acute or short-acuminate, broad-cuneate or rounded at base, remotely and shallowly dentate above the middle, dark lustrous green above, glabrous; petiole 1–3 cm. long: fls. fragrant, in short-peduncled cymes 6–10 cm. across: fr. globose-ovoid, 8 mm. long, red. Fl.VI; fr.X. Ann. Hort. Bot. Pays-Bas,2:97,t(c). N.T.1:437. D.H.1:193. (*V. macrophyllum* Bl., *V. Buergeri* Miq.) Japan. Intr. 1859. Zone VII or VIII.—Handsome shrub with large lustrous lvs. and fragrant fls.

26. **V. foètidum** Wall. Half-evergreen upright shrub to 3 m., of dense habit; young brts. stellate-pubescent: lvs. obovate or elliptic to oblong-obovate, 2–6 cm. long, acute or acutish, rarely short-acuminate, cuneate, 3-nerved and with 1 or 2 pairs of additional lateral veins, usually toothed above the middle, glabrous above, pubescent on the veins beneath; petiole 4–8 mm. long, pubescent: fls. small, in pubescent cymes 5–8 cm. across, on short lateral spreading brts.: fr. broad-ellipsoid, 6–8 mm. long, scarlet. Fl.VI; fr.IX. (*V. ceanothoides* C. H. Wright.) Himal., S. W. China. Intr. 1901. Zone VII?

27. **V. theíferum** Rehd. Upright shrub to 4 m.; brts. glabrous: lvs. ovate-oblong, 7–12 cm. long, acuminate, rounded at base, remotely denticulate, dark green above, glabrous except silky hairs on the veins beneath, with 6–9 pairs of veins; petiole 1–2 cm. long, glabrous: cymes 5-rayed, 3–5 cm. across, on a peduncle 1–2.5 cm. long; calyx purple, glabrous; stamens about half as long or as long as corolla: fr. ovoid, 8 mm. long, red. Fl.V–VI; fr.X. S.T.2:t.121. C. and W. China. Intr. 1901. Zone (V).—Handsome shrub with large lvs. and ornamental bright red fr. in autumn.

A related species is **V. phlebótrichum** Sieb. & Zucc. Shrub to 2 m.: lvs. ovate to elliptic-ovate, 3–6 cm. long; petiole 2–5 mm. long; cymes slender-stalked, nodding, 2–4 cm. across; stamens very short, the filaments shorter than anthers. S.I.2:t.73(c). S.T.2:t.120. N.T.1:442. Japan. Cult. 1890. Zone VII?

28. **V. Wrightii** Miq. Upright shrub to 3 m.: brts. nearly glabrous: lvs. usually suborbicular to broad-obovate on flowering brts., ovate or broad-ovate on sterile shoots, 8–14 cm. long, abruptly acuminate, rounded or broad-cuneate at base, coarsely dentate, nearly glabrous except slightly pubescent on the veins beneath and with axillary tufts of hairs; petiole 6–20 mm. long: cymes 5-rayed, 5–10 cm. across, glabrous or slightly pubescent, on a stalk 6–20 mm. long; stamens longer than corolla: fr. globose-ovoid, 8 mm. long, red. Fl.V–VI; fr.IX–X. S.I.1:t.19. Japan. Intr. 1892. Zone V.—Var.

Héssei Rehd. Of dwarfer habit, lvs. ovate with fewer and shallower teeth: cymes smaller; stamens about as long as corolla. (*V. H.* Koehne.) Gt.58:91 (l). Japan. Intr. before 1809.—Ornamental shrub with showy fr.; the lvs. turning crimson in autumn.

29. **V. dilatàtum** Thunb. Upright bushy shrub to 3 m.; young brts. pilose: lvs. suborbicular to broad-ovate or obovate, 6–12 cm. long, abruptly short-acuminate, rounded or subcordate at base, coarsely toothed, hairy on both sides, with 5–8 pairs of veins; petiole 6–16 mm. long: cymes very numerous, 8–12 cm. across, pilose, on a peduncle 1–3 cm. long; stamens longer than the pubescent corolla: fr. broad-ovoid, 8 mm. long, scarlet. Fl.v–vi; fr.ix–x. Add.5:t.161(c). B.M.6215(c). G.F.4:150. A.F.15:123(h). S.L.421(h). Japan. Intr. before 1845. Zone V.—Var. **xanthocárpum** Rehd. Fr. yellow. Gn.90:8(h). Cult. 1919.—Handsome free-flowering shrub, with showy fls. and decorative fr. in autumn remaining a long time on the brs.

30. **V. betulifòlium** Batal. Shrub to 4 m.; brts. glabrous, becoming red-brown: lvs. ovate or rhombic-ovate, sometimes elliptic-oblong, 3–8 cm. long, acute or short-acuminate, broad-cuneate, coarsely dentate except near base, dark green and glabrous above, lighter beneath and sparingly hairy on the veins and bearded in the axils, with 4 or 5 pairs of veins; petioles slender, 1–1.5 cm. long, glabrous or slightly hairy, with 2 small stipules: cymes 6–10 cm. across, short-stalked, rather loose, usually 7-rayed, sparingly hairy or nearly glabrous; ovary glandular and sparingly hairy or nearly glabrous; stamens longer than corolla: fr. globose-ellipsoid, about 6 mm. long, red. Fl.vi–vii; fr.ix–x. B.M.8672(c). S.T.2:t.147. C. and W. China. Intr. 1901. Zone V.—Ornamental shrub with attractive fr.

31. **V. lobophýllum** Graebn. Shrub to 5 m.; brts. glabrous or sparingly hairy at first, becoming dark red-brown: lvs. ovate to orbicular-ovate or broad-obovate, 5–11 cm. long, acuminate, often abruptly so, truncate or broad-cuneate at base, dentate with shallow mucronate teeth, glabrous except pubescent on the midrib above and slightly hairy on the veins beneath, with 5 or 6 pairs of veins; petiole 1–3 cm. long, with small, sometimes caducous, stipules: cyme 7-rayed, 5–10 cm. across, on a stalk 1–2.5 cm. long, minutely pubescent and glandular, rarely glabrescent; ovary glandular and sparingly hairy; stamens longer than the corolla: fr. subglobose, 8 mm. long, bright red. Fl.vi–vii; fr.ix–x. S.T.2:t.148. G.C.III.60:197. Gn.89:614. C. and W. China. Intr. 1901. Zone V.

A related species is **V. ovatifòlium** Rehd. Lvs. ovate to oblong-ovate, acuminate, rounded at base, 5–7 cm. long, with 7–8 pairs of veins slightly hairy beneath: cymes 4–6 cm. across, 5–7-rayed; ovary stellate-pubescent; stamens shorter than corolla. W. China. Intr. 1904 or 1908? Zone V.

32. **V. dasyánthum** Rehd. Shrub to 2.5 m.; brts. glabrous, becoming red-brown or dark purple: lvs. ovate or elliptic to oblong, 6–12 cm. long, acuminate, rounded at base, rarely broad-cuneate, remotely denticulate, dark green and glabrous above, bearded in the axils beneath, with 6–7 pairs of veins; petiole 1.5–2 cm. long, glabrous, usually purplish, stipulate: cyme 7-, rarely 5-rayed, 8–10 cm. across; peduncle 1–3 cm. long, purplish, like the rays of the 1st order glabrous, those of the 2d order villous; ovary densely villous; corolla villous outside; stamens longer than corolla: fr. short-ellipsoid, 8 mm. long, bright red. Fl.vi–vii; fr. ix–x. S.T.2:t.149. C. China. Intr. 1907. Zone VI?

33. **V. hupehénse** Rehd. Shrub to 2 m.; brts. stellate-pubescent at first, becoming glabrous and purplish brown: lvs. broad-ovate to ovate, 5–7 cm. long, acuminate, truncate or subcordate, coarsely dentate, loosely fascicled-

pubescent above, more densely beneath, with 7 or 8 pairs of veins; petiole 8–15 mm. long, densely pubescent, stipulate; cymes 4–5 cm. across, usually 5-rayed, villous; corolla pubescent outside; stamens slightly longer than corolla: fr. ovoid, 8 mm. long, red. Fl.VI; fr.IX. C. China. Intr. 1907. Zone V.

34. **V. erósum** Thunb. Upright shrub to 2 m.; brts. pubescent when young, slender: lvs. elliptic-ovate or oblong-ovate to oblong-obovate, 4–8 cm. long, acuminate, rounded or broad-cuneate at base, sharply dentate, with 7–10 pairs of veins, glabrous except on the veins and in their axils beneath, or slightly pubescent above and beneath; petiole 2–6 mm. long, stipulate: cymes 6–8 cm. across, usually 5-rayed, rather loose, on a slightly pubescent stalk 1–2.5 cm. long; stamens slightly longer than corolla; ovary glabrous: fr. globose-ovoid, 6 mm. long, red. Fl.V–VI; fr.IX. G.F.9:85. N.T.444. Japan. Intr. 1844. Zone V.

A closely related species is **V. ichangénse** Rehd. Lvs. ovate to ovate-lanceolate, 3–6 cm. long, scabrid above, pubescent beneath, rarely glabrescent: cymes 2.5–4 cm. across; ovary densely villous; stamens shorter than corolla. S.T.2:t.150. C. and W. China. Intr. 1901. Zone VI or VII?

35. **V. dentátum** L. ARROW-WOOD. Upright bushy shrub to 5 m.; brts. glabrous, becoming gray: lvs. suborbicular to ovate, 3–8 cm. long, short-acuminate, rounded or subcordate, coarsely dentate, glabrous and lustrous above, glabrous beneath or bearded in the axils of the veins, with 6–10 pairs of veins; petiole 1–2.5 cm. long: cymes slender-stalked, 5–8 cm. across, glabrous; stamens longer than corolla: fr. globose-ovoid 6 mm. long, blue-black. Fl.V–VI; fr.X. G.O.t.103(c). W.D.1:25(c). G.F.10:332. Em.2:414,t. N. B. to Minn., s. to Ga. Intr. 1736. Zone IV.—Handsome shrub with conspicuous fls.

36. **V. pubéscens** Pursh. Shrub to 3 m.; young brts. stellate-pubescent, becoming grayish brown: lvs. ovate to suborbicular, 5–10 cm. long, acute or short-acuminate, rounded or subcordate, coarsely dentate, glabrous or sparingly hairy above, stellate-pilose beneath chiefly on the veins, with 7–9 pairs of veins; petiole 1–2 cm. long, pubescent, exstipulate: cymes slender-stalked, 6–10 cm. across, slightly pubescent: fr. globose-ovoid, 6 mm. long, blue-black. Fl.VI–VII; fr.IX–X. S.T.1:t.43. G.F.4:29. B.C.6:3462. S.O.3:t.179(c, as *V. dentatum*). (*V. venosum* Brit., *V. dentatum* var. *p.* Ait., *V. molle* of auth., not Michx., *V. nepalense* Hort.) Mass. to Va. Intr. 1736.—Var. **Cánbyi** Blake. Lvs. thinner, larger and broader, those below the infl. often 5–8 cm. broad, less pubescent beneath: cymes larger. W.A.20,t(h). S.L.422(h). (*V. venosum* var. *C.* Rehd., *V. C.* Sarg.) Del. to Pa. Cult. 1884.—Var. **indianénse** Rehd. Similar to the preceding, but brts. glabrous, lvs. more coarsely dentate, and petioles usually with subulate stipules. Ind. Intr. 1923. Zone V.—Var. **Deámii** Rehd. Lvs. usually orbicular-ovate, sparingly pubescent above, rather densely soft-pubescent beneath, with 9–11 pairs of veins; petioles often with subulate stipules. Ind. Intr. 1923. Zone V.—Var. **longifólium** Blake. Lvs. narrower and longer, usually ovate-oblong, pubescent on both sides, more densely beneath; petiole exstipulate: infl. glabrous or pubescent. S.H.2:f.415k(l). (*V. venosum* var. *l.* Rehd., *V. dentatum* var. *l.* Dipp.) Cult. 1830?

37. **V. scabréllum** Chapm. Shrub to 2 m.; brts. scabrid with stellate pubescence, becoming red-brown: lvs. ovate to oblong-ovate, rarely broad-ovate, 3–10 cm. long, acute or acuminate, rounded or sometimes subcordate or broad-cuneate at base, remotely dentate with broad shallow often rounded teeth, glabrous or nearly so above, stellate-pilose at least on the veins beneath; petiole rather stout, 5–15 mm. long, pubescent; cyme densely stellate-pubescent on a stalk 2–4 cm. long; corolla rather large: fr. short-ellipsoid, 6–8 mm. long,

blue-black. Fl.vi; fr.ix–x. B.B.3:271. (*V. molle* of auth., not Michx., *V. semitomentosum* Rehd.) Pa. to Fla. and Tex. Cult. 1830. Zone VI or VII?

38. **V. affîne** Bush. Shrub to 2 m.; brts. glabrous, becoming gray-brown: lvs. broad-elliptic to ovate, 3–8 cm. long, acute or acuminate, rounded or subcordate, coarsely dentate, glabrous or slightly pubescent on the veins beneath, with 4–6 pairs of veins; petiole 2–12 mm. long: cymes 3–7 cm. broad, dense, on a stalk 1–3 cm. long: fr. ellipsoid, 7–9 mm. long, bluish black. Fl.v–vi; fr.ix. (*V. pubescens* var. *a.* Rehd.) Mo. Intr. 1899. Zone V.—Var. **hypomálacum** Blake. Lvs. glabrous or slightly pubescent above, densely soft-pubescent beneath; petiole 2–6 mm. long. G.F.3:125. B.C.6:3463. Gng.5:311(h). S.L.422(h). (*V. pubescens* of auth., not Pursh.) Que. to Ga., w. to Man. and Ill. Cult. 1830? Zone IV.—A handsome shrub of dense habit and very floriferous, particularly the var.

A related species is **V. bracteàtum** Rehd. Shrub to 3 m.: lvs. orbicular-ovate, 5–12 cm. long, cordate or subcordate, obtusely sinuate-dentate, pubescent on the veins beneath; petiole 1.5–2 cm. long; cyme 4–8 cm. across, with conspicuous bractlets: fr. 1 cm. long. S.T.1:t.68. Ga. Cult. 1904. Zone V.

39. **V. mólle** Michx. Shrub to 4 m.; bark exfoliating in thin flakes; brts. glabrous, becoming light gray: lvs. suborbicular to broad-ovate, 6–12 cm. long, short-acuminate, deeply cordate, coarsely dentate, glabrous and dark green above, paler and pubescent beneath; petiole 1.5–3 cm. long, stipulate: cymes long-stalked, puberulous, 5–8 cm. across: fr. ellipsoid, 1 cm. long, flattened, blue-black. Fl.vi; fr.viii–ix. B.B.3:272. Bot. Gaz.22:t.8. (*V. Demetrionis* Deane & Robins.) Iowa to Ky. and Mo. Intr. 1923. Zone V.—Var. **leiophýllum** Rehd. Lvs. glabrous or nearly so beneath. Intr. 1900.—Distinct shrub easily recognized by the flaky bark and the light gray young brts.

40. **V. acerifòlium** L. Dockmackie. Upright shrub to 2 m.; young brts. pubescent: lvs. suborbicular to ovate, 3-lobed, sometimes slightly so, 5–10 cm. long, rounded to cordate at base, the lobes acute to acuminate, coarsely dentate, slightly pubescent above, more densely so and with black dots beneath; petiole 1–2.5 cm. long: fls. yellowish white, in long-stalked cymes 3–8 cm. broad: fr. ellipsoid, 6–8 mm. long, nearly black. Fl.v–vi; fr.ix. G.O.t. 104(c). W.D.t.118(c). Em.2:414,t. N. B. to Minn., s. to N. C. Intr. 1736. Zone IV or III.—Var. **glabréscens** Rehd. Lvs. glabrous or nearly so. N. C. Intr. 1912.—Var. **ovàtum** Rehd. Lvs. ovate, remotely dentate, subcordate. Cult. 1920.—Neither the fls. nor the frs. are conspicuous, but the lvs. turn bright crimson in autumn.

A closely related species is **V. orientàle** Pall. Lvs. suborbicular, 3-lobed, 6–15 cm. long, cordate to subcordate, glabrescent except bearded in the axils beneath and without black dots. Gt.17:8,t. S.L.418. W. Asia, Cauc. Intr. 1827. Zone V.—Another related species is **V. ellípticum** Hook. Shrub to 2.5 m.: lvs. broad-elliptic, sometimes suborbicular, to elliptic-oblong, 3–7 cm. long, obtuse or acute, subcordate, 3-nerved at base, coarsely dentate above the middle, pubescent beneath at least on the veins; petiole 6–20 mm. long: cymes 4–5 cm. across, long-stalked, pubescent: fr. ellipsoid, about 12 mm. long. D.H.1:182. S.H.2:f.415p-r(l). Wash. to Calif. Intr. 1908. Zone (V).

Sect. 9. Opulus DC. Lvs. deciduous, 3–5-nerved at base, lobed, rarely without lobes, stipulate: drupe red; stone flattened, not or scarcely grooved: winter-buds with 2 connate outer scales: glabrous shrubs, or pubescent with simple hairs.

41. **V. pauciflòrum** Raf. Straggling shrub, to 1.5 m.; brts. glabrous: lvs. suborbicular to broad-elliptic, 5–8 cm. long, with 3 short acute lobes at apex, rounded or truncate at base, unequally serrate, glabrous or slightly pubescent beneath; petiole 1–2.5 cm. long: cyme 1.5–2.5 cm. across; stamens shorter

than corolla: fr. globose-ellipsoid, about 8 mm. long, red. Fl.v; fr.VIII–IX. G.F.3:5. (*V. eradiatum* House.) Nfld. and Lab. to Alaska, s. to N. H., Vt., Colo. and Wash.; N. E. Asia. Intr. 1880. Zone I.—Rarely cultivated; succeeds best in a half-shady, moist and cool situation.

42. **V. kansuénse** Batal. Shrub to 3 m., with gray brs.; brts. glabrous: lvs. broad-ovate to oblong-ovate in outline, deeply 3–5-lobed, 2.5 cm. long, acuminate, broad-cuneate to subcordate, the lobes acuminate to acute, coarsely toothed with mucronulate teeth, sparingly pubescent above, at least on veins, bearded in the axils beneath: petiole slender, 1–2.5 cm. long: fls. pinkish white, in 5–7-rayed cymes about 3 cm. wide; stamens longer than corolla: fr. ellipsoid, 8–10 mm. long, red. Fl.VI–VII; fr.IX. W. China. Intr. 1908. Zone V?

43. **V. trílobum** Marsh. CRANBERRY-BUSH. Shrub to 4 m., with gray brs.; brts. glabrous: lvs. broad-ovate, 5–12 cm. long, rounded or truncate at base, lobes acuminate, coarsely dentate, sometimes the middle lobe elongated and entire, pilose on the veins beneath or nearly glabrous: petiole 1–3 cm. long, with shallow groove and small, usually stalked glands: cyme 7–10 cm. across, on a stalk 1.5–3 cm. long; stamens about twice as long as corolla: fr. subglobose or short-ellipsoid, 8–10 mm. long, scarlet. G.O.t.20(c). B.B.3:270. (*V. americanum* auth., not Mill., *V. Opulus* var. *americanum* Ait., *V. Opulus* var. *pimina* Michx., *V. edule* Pursh, *V. oxycoccus* Pursh, *V. Opulus* Am. auth., not L.—High Cranberry.) N. B. to B. C., s. to N. Y., Mich., S. D. and Ore. Intr. 1812. Zone I.—Handsome shrub with ornamental fr. beginning to color end of July and remaining on the brs. all winter.

44. **V. Opulus** L. EUROPEAN CRANBERRY-BUSH. Shrub to 4 m., with rather smooth light gray brs. and stems; brts. smooth and glabrous: lvs. similar to those of No. 43, with rather shorter, more-toothed lobes, pubescent beneath or sometimes glabrous; petiole 1–2 cm. long, with narrow groove and a few large disk-like glands: cyme on a stalk 1–3.5 cm. long: fr. subglobose, 8 mm. across, red. Fl.V–VI; fr.VIII–IX. S.E.4:t.639. F.D.28:t.2912(c). Eu., N. Afr., N. Asia. Cult. since centuries. Zone III.—Var. **variegàtum** West. With variegated lvs.—Var. **xanthocárpum** Endl. Fr. yellow. Gn.88:204.—Var. **rôseum** L. COMMON SNOWBALL. All fls. sterile forming a globose head 5–6 cm. across. Gng.1:9(h). Gn.M.39:146(h). Gn.76:35(h);88:204. (Var. *sterile* DC., *V. roseum* Hort.—Guelder Rose.) The Snowball-tree is often planted for its large globose fl.-heads; the lvs. turn deep red in autumn.

45. **V. Sargénti** Kochne. Similar to the preceding, but bark darker, fissured and somewhat corky: brts. with prominent lenticels, pilose or glabrous when young: lvs. of thicker texture, often larger, the upper ones usually with much elongated entire middle lobe and short spreading lateral lobes, sometimes oblong-lanceolate and without lobes; petiole 2–3.5 cm. long, with large disk-like glands: cymes on a stalk 2–6 cm. long; stamens with purple anthers; sterile fls. larger, to 3 cm. across: fr. subglobose, 8–10 mm. long, scarlet. S.I.2:t.73(c). S.T.1:t.42. Gn.M.33:39(h). H.B.1:255(h). (*V. pubinerve* Bl., *V. Opulus* var. *S.* Takeda.) N. E. Asia. Intr. 1892. Zone V or IV.—Var. **calvéscens** Rehd. Lvs. glabrous or nearly so beneath. Intr. 1892.—Var. **flàvum** Rehd. With yellow fr.; fls. with yellow anthers: lvs. pubescent on the veins beneath. Intr. 1904.

3. **SYMPHORICÁRPUS** L. Deciduous upright or sometimes prostrate. shrubs; winter-buds with about 2 pairs of outer scales: lvs. opposite, short-petioled, entire or occasionally on vigorous shoots lobed, exstipulate: fls. perfect, axillary, usually forming axillary or terminal clusters or terminal

spikes; calyx 4–5-toothed: corolla campanulate to tubular, 4–5-lobed; stamens 4–5, inserted on the tube, included or slightly exserted; style slender, with capitate stigma: ovary with 2 fertile 1-ovuled and 2 sterile several-ovuled cells: fr. a 2-seeded berry. (Greek *symphorein*, to bear together, and *karpos*, fruit; referring to the clustered fr.) Syn.: *Symphoria* Pers. About 15 species in N. Am., s. to Mex. and 1 in China.—Ornamental shrubs chiefly cultivated for their showy frs.

A. Fr. white or pinkish; corolla usually pubescent inside.
B. Fls. campanulate.
C. Style and stamens exserted.....1. *S. occidentalis*
CC. Style and stamens included.
D. Brts. glabrous: stamens shorter than corolla.....2. *S. albus*
DD. Brts. and lvs. pubescent: stamens about as long as corolla.....3. *S. mollis*
BB. Fls. tubular to funnelform; style and stamens included.
C. Anthers reaching to about the middle of the corolla-lobes.
D. Corolla 6–8 mm. long, tube pubescent within: lvs. pubescent...4. *S. rotundifolius*
DD. Corolla 8–12 mm. long, glabrous or nearly so within: lvs. glabrous or nearly so. 5. *S. oreophilus*
CC. Anthers as long as corolla-lobes.....6. *S. microphyllus*
AA. Fr. red or bluish black: corolla campanulate, glabrous inside.
B. Fls. in leafy spikes or axillary dense clusters: fr. red: pubescent shrub..7. *S. orbiculatus*
BB. Fls. in peduncled terminal spikes: fr. bluish black: glabrous shrub.....8. *S. sinensis*

1. **S. occidentàlis** Hook. Wolfberry. Shrub to 1 or 1.5 m., with upright rather stiff brs.: lvs. oval or ovate, 2–7 cm. long, obtuse, cuneate to rounded at base, entire or undulate-crenate, grayish green and pubescent beneath or glabrate: fls. in clusters or spikes 1–3 cm. long; corolla pinkish, 6 mm. long, densely hairy within; stamens and style slightly longer than corolla-lobes: fr. subglobose, white, about 1 cm. across. Fl.vi–vii; fr.ix. G.F.3:297. G.C.III. 49:104,t. B.B.3:277. Mich. to B. C., s. to Ill., Colo. and Kans. Cult. 1880. Zone I.—Var. **Heŷeri** Dieck. Lvs. thinner, less distinctly veined beneath; style and stamens somewhat shorter. D.H.1:281(1). (*S. Heyeri* Dipp.) Colo. Cult. 1888. Zone II?

2. **S. albus** Blake. Snowberry. Shrub to 1 m., with upright slender brs.: lvs. oval to elliptic-oblong, 2–5 cm. long, obtuse, on shoots often sinuately lobed, pubescent beneath: fls. in terminal spikes or clusters; corolla pinkish, about 6 mm. long, pubescent inside: fr. globose or ovoid, 8–12 mm. long. Fl.vi–ix; fr.ix–xi. (*S. racemosus* Michx.—Waxberry.) N. S. to Alaska, s. to Pa., Idaho and Calif. Intr. 1879? Zone III?—Var. **laevigàtus** Blake. Taller, to 2 m.: lvs. usually larger and broader, 3–7 cm. long, glabrous: fr. larger and in larger clusters. Add.3:t.94(c). B.M.2211(c). Gn.77:527;86:477;84:17(h). (*S. racemosus* var. *l.* Fern.) Que. to Wash., s. to Va., Mich. and Mont., Idaho and Calif.; often escaped from cult. Intr. 1817.—Var. **ovàtus** Rehd. A form of the preceding var. with broad-ovate, bluish green lvs., rounded or nearly truncate at base. (*S. o.* Spaeth.) Intr. about 1888.—The Snowberry commonly cult. as *S. racemosus* is var. *laevigatus* while the plant sometimes grown as *S. rac.* var. *pauciflorus* is typical *S. albus;* the true var. *pauciflorus* Blake with smaller lvs. and 1–3 fls. at end of brts. is apparently not in cult. The Snowberry is chiefly planted for its white fr. in autumn and early winter.

3. **S. móllis** Nutt. Low diffuse or procumbent shrub: brts. puberulous to velutinous: lvs. suborbicular to elliptic, 1–3 cm. long, obtuse or acutish, often irregularly dentate, pubescent above, soft-pubescent and grayish or whitish beneath: fls. in terminal few-fld. clusters and solitary or in pairs in the axils below: corolla pinkish or white, about 4 mm. long; stamens as long as corolla: fr. subglobose, white, 6–8 mm. across. Fl.vi–vii; fr.viii–ix. D.H.1:279(1). B. C. to Calif. Cult. 1896. Zone V.—Var. **acùtus** Dieck. Less densely pubescent or sometimes glabrate: lvs. obovate or elliptic-ovate to elliptic-oblong,

acute or acutish, sometimes lobed; corolla less pubescent inside. D.H.1:280(l). (*S. a.* Dipp.) B. C. to Calif. Intr. before 1885.

4. **S. rotundifòlius** Gray. Upright shrub to 1 m.; brts. minutely pubescent at first: lvs. suborbicular to oval or ovate, 1–2.5 cm. long, obtuse or acute, sometimes sinuately dentate, usually puberulous above, pubescent and grayish beneath: fls. usually in 2–5-fld. terminal spikes and axillary; corolla pinkish, tubular-campanulate, 6–8 mm. long; tube pubescent within except near mouth: fr. ellipsoid, 1 cm. long, white; seeds blunt at ends. Fl.v–vi. S.H.2: f.430q-r,431f-k. Wash. to Calif. and N. Mex. Cult. 1896. Zone VI?

Related species are: **S. vaccinioìdes** Rydb. Intricately branched low shrub: lvs. elliptic, 1–2 cm. long, acute at ends, dark green above, glaucescent beneath, glabrous or puberulent; corolla 6–8 mm. long. Alb. to Wash., Nev. and Wyo. Intr. about 1896.—**S. utahénsis** Rydb. Shrub to 1 m. or more: lvs. broad-ovate, 2–4 cm. long, obtuse and often mucronulate, pubescent when young, later glabrescent: fls. partly in terminal drooping short spikes; corolla 8 mm. long. Utah to Colo. Cult. 1908.

5. **S. oreóphilus** Gray. Upright shrub to 1.5 m., with slender spreading brs.; young brts. glabrous or puberulous: lvs. elliptic, 1–4 cm. long, usually acutish, slightly puberulous above or glabrous, grayish pubescent beneath or glabrescent: fls. mostly in axillary pairs, or in few-fld. terminal spikes: corolla pinkish, tubular-funnelform, about 1 cm. long, tube 4–5 times as long as lobes, nearly glabrous within: fr. ellipsoid, about 8 mm. long; seeds pointed on one end. Fl.vi–vii. I.T.3:t.98. Ore. to Calif. and Ariz. Intr. 1894. Zone V or VI.

6. **S. microphýllus** Kunth. Upright shrub to 3 m.; brts. glabrous or puberulous: lvs. ovate, 1–3 cm. long, acute, rounded at base, bluish gray and pubescent beneath: fls. in terminal clusters and axillary: corolla pinkish, about 1 cm. long, pubescent inside; style about as long as tube: fr. pink or white and tinged pink. Fl.viii–ix. B.M.4975(c). Mex. Intr. 1829. Zone VIII?

S. m. × *orbiculatus* = **S. Chenaùltii** Rehd. Lvs. more pubescent beneath: fls. spicate: corolla-tube only twice as long as lobes, less pubescent within; style pilose, shorter: fr. subglobose, red, with minute pale dots, usually on one side whitish with red dots. Orig. before 1912. Zone V.—Neat little shrub, handsome in fr.

7. **S. orbiculàtus** Moench. Indian Currant. Shrub to 2 m., with slender upright brs. pubescent when young: lvs. elliptic or ovate, 1.5–3.5 cm. long, obtuse or acutish, rounded at base, dull green above, glaucescent and pubescent beneath: fls. in dense and short axillary clusters and terminal spikes; corolla campanulate, 4 mm. long; stamens and the pilose style included: fr. subglobose, 4–6 mm. across, purplish red. Fl.vii; fr.x–xii(–iii). Add.3:t. 111(c). S.O.2:t.115(c). G.C.III.28:413. Gn.34:280. M.M.1:84. (*S. vulgaris* Michx., *S. parviflorus* Desf., *S. Symphoricarpus* MacM., *Symphoria glomerata* Pursh.) N. J. to Ga., Kans. and Tex., w. to S. Dak., sometimes escaped. Intr. 1730. Zone V.—Var. **variegàtus** Schneid. Lvs. variegated with yellow. (Var. *aureo-reticultus* Zab.)—Very attractive in autumn, with the slender brs. furnished almost their whole length with red frs.; the lvs. turn crimson in autumn and persist a long time.

8. **S. sinénsis** Rehd. Upright shrub to 1.5 m., quite glabrous; the slender brts. becoming red-brown: lvs. elliptic to rhombic-ovate, 1.5–2.5 cm. long, acute or obtusish, cuneate, glaucescent beneath: fls. sessile, solitary, forming a peduncled slender terminal 6–12-fld. spike: corolla campanulate, 7 mm. long, with slightly ventricose tube; style glabrous, as long as stamens: fr. ovoid, 7 mm. long, bluish black, bloomy. Fl.vii–ix. C. China. Intr. 1907. Zone V or VI?

4. **DIPÉLTA** Maxim. Deciduous shrubs; winter-buds with several pairs of pointed scales, glabrous: lvs. opposite, short-petioled, entire or denticulate, exstipulate: fls. solitary or in leafy few-fld. racemes, with several conspicuous unequal bracts at base, the 2 larger ones covering the ovary; calyx-lobes linear to lanceolate; corolla tubular-campanulate, slightly 2-lipped; stamens 4, didynamous, included; style slender, shorter than corolla: ovary elongated, 4-celled, 2 cells with 1 fertile ovule each and 2 with several sterile ovules: fr. a caps. enclosed by the persistent bracts. (Greek *dis*, twice, and *pelte*, shield; in reference to the shape of the floral bracts.) Four species in C. and W. China. —Ornamental shrubs with very handsome fls., resembling Diervilla.

A. Bracts shield-like, attached by their centre: lvs. entire: corolla narrowed into a slender base.....1. *D. floribunda*
AA. Bracts auriculate, attached by their deeply cordate base: lvs. denticulate; corolla wide and gibbous at base.....2. *D. ventricosa*

1. **D. floribúnda** Maxim. Shrub to 5 m.; bark peeling; young brts. glandular-pubescent: lvs. ovate to elliptic-lanceolate, 5–10 cm. long, acuminate, rounded or cuneate at base, entire, or on vigorous shoots remotely denticulate, puberulous at first, soon glabrous; petiole 4–6 mm. long: fls. fragrant, on slender nodding pedicels in 1–6-fld. racemes; sepals linear, 5–6 mm. long; corolla tubular-campanulate, 3 cm. long, pale rose, orange-yellow in throat; the largest bract 1.8–2.5 cm. across in fr. Fl.v. B.M.8310(c). G.C.III.60: 38;71:321. Gn.88:582. J.L.40:f.54. M.O.t.26. C. China. Intr. 1902. Zone V.—Var. **parviflòra** Rehd. Lvs. 3.5–6 cm. long, less pubescent: fls. usually solitary, about 2 cm. long. N. W. China. Intr. 1914.

2. **D. ventricòsa** Hemsl. Shrub to 6 m.; young brts. puberulous: lvs. elliptic to lanceolate, 5–14 cm. long, long-acuminate, usually rounded at base, remotely glandular-denticulate or entire, sparingly hairy above, villous on the veins beneath: fls. on drooping slender pedicels, 1–4 axillary and terminal on short brts.; sepals subulate, 8 mm. long; corolla campanulate, deep rose outside, paler within, orange in throat; the largest bract about 2 cm. across in fr. Fl.v–vi. B.M.8294(c). G.C.III.44:401. B.S.1:497. W. China. Intr. 1904. Zone V or VI.

5. **ABÈLIA** R. Br. Deciduous, rarely evergreen shrubs; winter-buds small, ovoid, with several pairs of outer scales: lvs. opposite, short-petioled, small or medium-sized, entire or dentate: fls. on 1 or 2-fld. peduncles axillary or terminal, sometimes forming terminal panicles or clusters; sepals 2–5, conspicuous, accrescent, persistent; corolla tubular or salver-shaped to campanulate, 5-lobed; stamens 4, didynamous, inserted at base of corolla-tube; ovary 3-celled, only 1 cell fertile and 1-ovuled; style elongated: fr. a 1-seeded leathery achene, crowned by the persistent sepals. (After Dr. Clarke Abel, physician and author in China; 1780–1826.) About 25 species in E. Asia, 1 in the Himal., and 2 in Mex.—Ornamental shrubs planted chiefly for their handsome fls.

A. Corolla campanulate-funnelform; brts. pilose, villous or glabrous, slender; sepals 2 or 5. Sect. 1. Euabelia Rehd.
B. Sepals 2.
c. Corolla 1.5–2 cm. long.....1. *A. Engleriana*
cc. Corolla 2.5–3 cm. long.....2. *A. Schumannii*
BB. Sepals 5 or 2–5.
c. Sepals 2–5 on the same plant.....3. *A. grandiflora*
cc. Sepals 5.....4. *A. chinensis*
AA. Corolla salver-shaped with cylindric tube; brts. with reflexed setose hairs, rarely glabrate, thickened at the nodes; sepals 4 or 5.....Sect. 2. Zabelia Rehd.
B. Sepals 5: infl. subcapitate.....5. *A. triflora*
BB. Sepals 4: fls. usually 2 at end of short brts.....6. *A. Zanderi*

1. **A. Engleriàna** Rehd. Bushy shrub to 2 m., with spreading slender brs.; young brts. puberulous: lvs. ovate to elliptic-ovate or elliptic-lanceolate, 2–3.5 cm. long, acute to acuminate, cuneate, sparingly serrulate, lustrous green, sparingly hairy on the veins beneath: fls. several on short lateral brts.; sepals oblong-elliptic, 8 mm. long; corolla rosy pink, tubular below the middle, campanulate above, gibbous at base. Fl.VI–VII. (*Linnaea E.* Graebn.) C. and W. China. Intr. 1908. Zone V.

Another small-fld. species with 2 sepals is **A. serràta** Sieb. & Zucc. Lvs. rhombic-ovate, 1.5–2.5 cm. long, entire or with few shallow teeth; peduncles 2-fld.; corolla funnelform, gradually widened toward the apex. S.Z.1:t.34(c). N.T.1:453. Japan. Intr. before 1900? VII or VIII?

2. **A. Schumánnii** Rehd. Slender shrub; young brts. dark purple and puberulous: lvs. ovate or elliptic-ovate, 1.5–2.5 cm. long, obtusish and mucronulate, cuneate, entire or slightly serrulate, ciliate, villous along the midrib beneath: fls. several on 1-fld. axillary stalks near end of short brts.; sepals elliptic, 6–10 mm. long; corolla rosy-pink, campanulate, tubular at the lower third, gibbous at base, pink, minutely glandular-puberulous outside; filaments hirsute. Fl.VI–VIII. (*Linnaea S.* Graebn.) B.M.8810(c, as *A. longituba*). W. China. Cult. 1915.

Other related species are: **A. Graebneriàna** Rehd. Shrub to 3 m.: lvs. ovate to oblong-ovate, 3–5 cm. long, acuminate, remotely serrate, pubescent on the midrib beneath: fls. on 1-fld. peduncles, few at end of short lateral brts.; corolla campanulate, 2.5 cm. long, pink, yellow in throat. C. China. Intr. 1910. Zone VI or VII.—**A. uniflòra** R. Br. Evergreen spreading shrub to 2 m.; lvs. ovate, 2–5 cm. long, acuminate, sparingly serrulate, lustrous dark green above, paler beneath and pubescent on the midrib: fls. on 1–3-fld. peduncles, several at end of brts.; corolla campanulate, 2.5 cm. long, white, tinged pink, orange in throat. B.M.4694 (c). G.C.III.37:323. F.S.8:t.824(c). Gn.27:425. (*Linnaea u.* A. Br. & Vatke.) E. China. Intr. 1845. Zone VIII?

3. × **A. grandiflòra** Rehd. (*A. chinensis* × *uniflora*). Half-evergreen shrub to 2 m.; brts. puberulous: lvs. ovate, 1.5–3.5 cm. long, acute, rounded or cuneate at base, lustrous dark green above, paler beneath and glabrous except bearded near base of midrib: fls. in leafy panicles at end of lateral brts.; sepals varying from 2–5, often partly connate, purplish; corolla campanulate, about 2 cm. long, white, flushed pink. Fl.VI–XI. Add.2:t.49(c). Gt.41:113,t(c). Gn.76:528(h). (*A. rupestris* var. *g.* André, *A. rupestris* Hort., not Lindl., *A. uniflora* Hort., not R. Br., *Linnaea Spaethiana* and *L. Perringiana* Graebn.) Orig. before 1880. Zone (V).—One of the handsomest Abelias valued on account of its long flowering season and its lustrous half-evergreen foliage.

4. **A. chinénsis** R. Br. Deciduous spreading shrub, to 1.5 m.; young brts. puberulous, reddish: lvs. ovate, 2–3.5 cm. long, acute or short-acuminate, rounded at base, serrate or serrulate, villous beneath near base of midrib and lateral veins, sometimes with scattered hairs above: fls. fragrant, in dense axillary and terminal cymes forming terminal dense and short panicles; sepals oblong-obovate, 6 mm. long, puberulous; corolla funnelform, about 1 cm. long, white; stamens exserted. Fl.VII–VIII. B.R.32:8(c). P.F.2:t.201(c). Gn.27:424. C. and E. China. Intr. 1844. Zone VII?

Another species with 5 sepals, but with larger fls., is **A. spathulàta** Sieb. Shrub to 1 m.: lvs. elliptic-lanceolate to ovate, 2–5 cm. long, unequally serrate, sparingly hairy above, downy on veins beneath: fls. in pairs at end of short brts.: corolla funnelform-campanulate, 2–2.5 cm. long, white with yellow throat; stamens shorter than corolla. B.M.6601(c). S.Z.1:t.34(c). (*Linnaea s.* Graebn.) Japan. Intr. 1880. Zone VIII?

5. **A. triflòra** R. Br. Shrub of upright habit, to 4 m.; bark of stems corrugated; young brts. reflexed-setose: lvs. lanceolate to ovate-lanceolate, 3–7

cm. long, long-acuminate, entire or with few coarse teeth, ciliate and sparingly hairy on both sides or nearly glabrous: fls. fragrant, in terminal clusters about 5 cm. across; sepals linear, 1–1.5 cm. long, hairy; corolla rosy-white, with pubescent tube about 1.5 cm. long and with spreading rounded lobes, limb about 1.2 cm. across. Fl.VI. P.F.3:t.91(c). R.H.1870:511,t(c). G.C.II.16:34. (*Linnaea t.* A. Br. & Vatke.) N. W. Himal. Intr. 1847. Zone VII.

6. **A. Zánderi** Rehd. Upright shrub to 3 m.; brts. glabrous, except scattered reflexed bristles near base: lvs. ovate-oblong to ovate-lanceolate, 3–7 cm. long, acuminate, broad-cuneate, rarely rounded at base, sparingly dentate or entire, sparingly hairy above, sparingly pilose beneath, more densely so on veins; petiole 2–4 mm. long: peduncles 2-fld., 2–6 mm. long, terminal on short lateral brts.; pedicels short; ovary glabrous; sepals oblanceolate to oblong, 7–10 mm. long, glabrous or minutely ciliolate: corolla salver-shaped, glabrous outside, tube 8–10 mm. long, with rounded spreading lobes; style as long as tube; stamens slightly shorter. (*Linnaea Z.* Graebn.) C. and N. W. China. Intr. 1910. Zone V.—Very variable.

A related species is **A. bifiòra** Turcz. Lvs. usually narrower and incisely serrate; fls. in terminal pairs; peduncle wanting; pedicels short; fr. sparingly setose, usually curved. Nouv. Arch. Mus. Paris II.6:t.11. (*Linnaea b.* Koehne.) N. China, Manch. Intr. ?

6. **LINNAÈA** L. Twinflower. Evergreen trailing subshrub: lvs. opposite, small, petioled, crenate, exstipulate: fls. in pairs on slender upright peduncles terminal on short brts.; calyx 5-parted; corolla campanulate, 5-lobed; stamens 4; ovary 3-celled, stipitate-glandular: 1 cell fertile and 1-ovuled: fr. ovoid, dry, indehiscent, 1-seeded. (After Linnaeus by Gronovius at his own request.) One circumpolar very variable species.

L. boreàlis L. Stems slender, sparingly pubescent: lvs. roundish or obovate, 6–25 mm. long, acute or obtuse, with few crenate teeth, usually ciliate and with scattered hairs above: fls. fragrant, pediceled, on slender peduncles 4–7 cm. long; sepals lanceolate, 1.5–3 mm. long: corolla campanulate, 6–9 mm. long, the tubular portion much shorter than the calyx: fr. yellow, about 3 mm. long. Fl.VI–VIII. R.I.17:t.119,f.1(c). S.E.4:t.644(c). Gn.24:177. M.G.25: 138(h). Act. Hort. Berg.4,7:t.1–13. (*L. serpyllifolia* Rydb.) N. Eu., N. Asia, N. Am. (Alaska). Cult. 1762. Zone I.—Var. **americàna** Rehd. Lvs. usually glabrous, ciliate near base: corolla 8–15 mm. long, the tubular portion exceeding the calyx; sepals 1.5–3 mm. long. B.B.3:276. (*L. a.* Forb.) Lab. to Alaska, s. to W. Va., Ind., Colo., Utah and N. Calif. Intr. 1800.—Var. **longifiòra** Torr. Lvs. slightly larger; corolla more funnelform, 10–16 mm. long, the tubular portion exceeding the calyx; sepals 3–5 mm. long. Act. Hort. Berg. 4,7:t.13,f.12. B. C. to Calif.—Handsome trailing plant; suited for a moist and half-shady position in the rock garden.

7. **KOLKWÍTZIA** Graebn. Deciduous upright shrub; winter-buds with several pairs of pointed pubescent scales: lvs. opposite, short-petioled, exstipulate: fls. in pairs forming terminal corymbs on short lateral brts.; sepals 5, narrow, pilose, spreading; corolla campanulate, 5-lobed; stamens 4, about as long as tube; the two ovaries inserted one above the other, sometimes partly connate, ellipsoid, narrowed into a long beak, hispid, with adnate bractlets, 3-celled, 1 cell fertile and 1-ovuled, the others sterile, several-ovuled: fr. dry, hispid like the pedicels and sepals. (After R. Kolkwitz, professor of botany, Berlin.) One species in China.

K. amàbilis Graebn. Shrub to 2 m.; young brts. pilose, older, with brown

flaky bark: lvs. broad-ovate, 3–7 cm. long, acuminate, rounded at base, remotely and shallowly toothed or nearly entire, ciliate, dull green above and sparingly hairy, pilose on the veins beneath; petiole pilose, 2–3 mm. long: fls. in corymbs 5–7 cm. across; peduncles 6–10 mm. long, pilose; corolla about 1.5 cm. long, pink, yellow in throat, puberulous: fr. ovoid, 6 mm. long, bristly. Fl.v–vi. B.M.8563(c). H.I.2937. G.C.III.74:4,5,7(h). H.B.2:487(h). C. China. Intr. 1901. Zone V.—Graceful ornamental shrub, very handsome in spring with its profusely produced pink fls.

8. **DIERVÍLLA** Adans. Deciduous shrubs; brs. with solid pith; winter-buds with several pairs of pointed scales: lvs. opposite, short-petioled to sessile, serrate, exstipulate: fls. in 1–several-fld. axillary cymes, often panicled at end of brts., yellow, white or pink to crimson; sepals 5, distinct or partly connate: corolla funnelform to funnelform-campanulate, sometimes slightly 2-lipped; stamens 5; style slender with capitate stigma; ovary elongated, 2-celled, many-ovuled: fr. a 2-valved septicidal caps., with numerous small angular, often winged seeds. (After Diereville or Dierville, a French surgeon who traveled in Canada 1699–1700 and introduced *D. Lonicera*.) Includ. *Weigela* Thunb. and *Calyptrostigma* Trautv. & Mey. About 12 species in N. Am. and E. Asia.—Ornamental shrubs, mostly with conspicuous and handsome fls.

A. Fls. yellow, funnelform, slightly 2-lipped, small, about 1 cm. long; seeds not winged. Sect. Eudiervilla Koehne.
  B. Brts. and lvs. glabrous or nearly so.
    C. Lvs. petioled ..... 1. *D. Lonicera*
    CC. Lvs. subsessile ..... 2. *D. sessilifolia*
  BB. Brts. and lvs. pubescent; lvs. subsessile ..... 3. *D. rivularis*
AA. Fls. white or pink to crimson, larger.
  B. Anthers not connected with each other; calyx not 2-lipped ..... Sect. Weigela Koehne.
    C. Sepals lanceolate, more or less connate: seeds not winged.
      D. Lvs. glabrous above, pubescent on veins or only on midrib beneath ... 4. *D. florida*
      DD. Lvs. pubescent above, soft-pubescent beneath ..... 5. *D. praecox*
    CC. Sepals linear, distinct: seeds winged.
      D. Lvs. and brts. pubescent.
        E. Fls. sessile, dark crimson (pale in a var.); style much exserted; ovary pubescent. 6. *D. floribunda*
        EE. Fls. peduncled, pink, carmine or white; style not exceeding the corolla-lobes.
          F. Lvs. gray-tomentose or densely soft-pubescent beneath: peduncles slender. 7. *D. hortensis*
          FF. Lvs. pubescent beneath, chiefly on the veins: peduncles short ... 8. *D. japonica*
      DD. Brts. and lvs. glabrous or nearly so ..... 9. *D. coraeensis*
  BB. Anthers connected with each other and pilose; calyx 2-lipped. Sect. Calyptrostigma Koehne 10. *D. Middendorffiana*

1. **D. Lonícera** Mill. Shrub to 1 m.; brts. nearly terete: lvs. ovate to ovate-oblong, 4–10 cm. long, acuminate, subcordate to broad-cuneate, serrate and ciliolate; petiole 3–6 mm. long: fls. yellow, in usually 3-fld. peduncled cymes; limb of corolla nearly as long as tube: caps. about 8 mm. long. Fl.vi–vii. B.M.1796(c). (*D. Diervilla* Macm., *D. canadensis* Willd., *D. trifida* Moench.) Nfld. to Sask., s. to N. C. and Mich. Intr. 1700. Zone II or I.

2. **D. sessilifòlia** Buckl. Shrub to 1.5 m.; brts. 4-angled: lvs. subsessile, ovate-lanceolate, 6–15 cm. long, acuminate, cordate or rounded at base, sharply serrate: fls. sulphur-yellow, in 3–7-fld. cymes often crowded into a dense terminal panicle; limb of corolla shorter than tube: caps. 9–12 mm. long. Fl.vi–viii. G.C.III.42:427. L.I.t.8. N. C. and Tenn. to Ga. and Ala. Intr. 1844. Zone IV.

D. s. × *Lonicera* = **D. spléndens** Kirchn. Similar to No. 2, but lvs. short-petioled. (*Weigela s.* Carr.) Orig. about 1850.

3. **D. rivulàris** Gatt. Shrub to 2 m.; brts. terete, densely short-pilose: lvs. subsessile, ovate to oblong-lanceolate, 4–8 cm. long, acuminate, cordate

to truncate, doubly serrate, pubescent on both sides: cymes few- to many-fld., crowded into terminal panicles; corolla lemon-yellow; limb about as long as tube: fr. 6 mm. long. Fl.VII–VIII. G.C.III.38:339. N. C. and Tenn. to Ga. and Ala. Cult. 1898. Zone V.

4. **D. flòrida** Sieb. & Zucc. Shrub to 3 m.; brts. with 2 rows of hairs: lvs. short-petioled to subsessile, elliptic to ovate-oblong, or obovate, 5–10 cm. long, acuminate, rounded to cuneate at base, serrate, glabrous above except on midrib, pubescent or tomentose on veins beneath; sepals nearly glabrous, connate about ½; ovary slightly pubescent; corolla funnelform-campanulate, about 3 cm. long, abruptly narrowed below the middle, rosy-pink outside, pale within, with rounded spreading lobes; stigma 2-lobed: caps. glabrous. Fl.v–vi. B.M.4396(c). F.S.3:t.211(c). R.H.1849:381,t(c). (*Weigela rosea* Lindl., *W. amabilis* Hort., *D. pauciflora* Carr.) N. China, Korea. Intr. 1845. Zone V.—Var. **alba** Rehd. Fls. white, changing to light pink. R.H.1861: 331,t(c). (Var. *candida* Voss, *Weigela rosea alba* Moore.)—Var. **variegàta** Bean. Lvs. edged with pale yellow; fls. deep rose. B.S.1:490.—Var. **venùsta** Rehd. Lvs. smaller, usually obovate, 3–6 cm. long, usually nearly glabrous: fls. in dense clusters with small lvs. at base; corolla rosy-pink, about 3.5 cm. long, rather gradually narrowed toward the base, lobes oval. Fl.v. B.M. 9080(c). N.K.11:t.39. (*D. v.* Stapf.) Korea. Intr. 1905.—One of the handsomest species and particularly the var. *venusta* is one of the most graceful and at the same time hardiest of the *Weigelas*.

5. **D. praècox** Lemoine. Shrub to 2 m.; brts. glabrous or pilose: lvs. short-petioled or subsessile, elliptic or elliptic-ovate to obovate, 5–8 or on vigorous shoots to 12 cm. long, acuminate, serrate, hairy above, soft pubescent beneath: fls. nodding, 3–5 on short lateral brts.; calyx and ovary pilose or the latter glabrate toward the base; corolla funnelform-campanulate, abruptly narrowed below the middle, rosy pink or purplish pink, yellow in throat, pubescent outside: caps. glabrous. Fl.v. Gt.46:t.1441(c). R.H.1905:314, 315. H.B.3: 73(h). N.K.11:t.38. Korea. Cult. 1894. Zone V.—Not as handsome as No. 4, but the earliest of all species to bloom.

6. **D. floribúnda** Sieb. & Zucc. Shrub to 3 m., with slender brs.; young brts. pubescent or at least with 2 rows of hairs: lvs. elliptic to oblong-ovate or oblong-obovate, 7–10 cm. long, acuminate, broad-cuneate, serrate, sparingly pubescent above, villous-pubescent beneath chiefly on the veins; petiole 2–5 mm. long: fls. sessile, crowded on short lateral brts.; corolla tubular-funnelform, 2.5–3 cm. long, pubescent outside, dark crimson, brownish crimson in bud, the lobes about 5 times shorter than tube; stamens as long as corolla; style exserted, often exceeding the lobes by 1 cm.: caps. pubescent. Fl.v–vi. S.Z.1:t.32(c). I.H.10:t.383(c). (*D. multiflora* Lem.) Japan. Intr. 1860. Zone V.—Var. **grandiflòra** Voss. Fls. larger, brownish crimson. (*W. arborescens* Hort.)—Var. **versícolor** Rehd. Fls. greenish white at first, changing to red or crimson: lvs. pilose on the veins beneath. S.Z.1:t.33(c). (*D. v.* Sieb. & Zucc.)

A related species is **D. subséssilis** Nakai. Lvs. subsessile, broad-ovate to obovate-oblong, subcordate to rounded at base, pilose on the veins beneath: fls. sessile; corolla greenish yellow or yellowish pink; style about as long as corolla: caps. sparingly pilose. N.K.11:t.41. Korea. Intr. ?

7. **D. horténsis** Sieb. & Zucc. Shrub to 3 m.; young brts. pilose: lvs. ovate or obovate to oblong, 5–10 cm. long, acuminate, serrulate, slightly pubescent above at first, later glabrate, densely grayish pubescent or tomentose beneath; petiole 2–5 mm. long: fls. on elongated 3-fld. pubescent peduncles: corolla tubular-campanulate, carmine; style exserted, as long or slightly

longer than lobes; ovary pilose: caps. glabrous. Fl.v–vi. S.Z.1:t.29,30(c). (*D. japonica* var. *h.* Rehd.) Japan. Cult. 1870. Zone VI or VII?—Var. **nívea** Voss. Fls. white. G.C.II. 10:80. Gn.22:185;34:352. (*D. japonica* var. *n.* Rehd., *D. japonica* var. *alba* Mak.) Intr. about 1864.

8. **D. japónica** DC. Shrub to 3 m.; young brts. glabrous or with 2 rows of hairs: lvs. elliptic to oblong-obovate, 5–10 cm. long, acuminate, rounded or cuneate at base, serrate, slightly pubescent above, densely villous-pubescent beneath; petiole 2–5 mm. long: peduncles 3-fld., several on short lateral brts.; corolla campanulate-funnelform, 2.5–3 cm. long, whitish at first, changing to carmine, slightly pubescent or nearly glabrous outside; style slightly exserted; ovary glabrous or sparingly pilose: caps. glabrous. Fl.v–vi. S.I.2:t.74(c). G.F.9:405. B.C.2:1008. (*Weigela j.* Thunb.) Japan. Intr. 1892. Zone V.—Var. **sínica** Rehd. Shrub to 6 m.: lvs. soft-pubescent beneath; petiole 8–10, rarely 5–7 mm. long: corolla abruptly contracted below the middle into a narrow tube, pale pink; ovary densely pubescent. C. China. Intr. 1908. Zone VI or VII?

9. **D. coraeénsis** DC. Shrub to 5 m.; brts. stout, glabrous: lvs. broad-elliptic or elliptic to obovate, 8–12 cm. long, abruptly acuminate, broad-cuneate, crenate-serrate, lustrous above and glabrous except on the veins, sparingly hairy on the veins beneath or quite glabrous, petiole 5–10 mm. long: fls. in peduncled cymes, several on short lateral brts.; corolla campanulate-funnelform, abruptly narrowed below the middle, 2.5–3 cm. long, glabrous, pale rose or whitish at first, changing to carmine; sepals linear-lanceolate, glabrous or ciliate; ovary glabrous. Fl.v–vi. S.Z.1:t.31(c). S.I.2:t.74(c). F.S.8:t.855(c). (*D. grandiflora* Sieb. & Zucc., *D amabilis* Carr.) Japan. Cult. 1850. Zone V.—Var. **alba** Voss. Fls. yellowish white, changing to pale rose. (Var. *arborea* Rehd., *Weigela grandiflora alba* and *W. arborea grandiflora* Hort.)

Another species with glabrous lvs. is **D. suávis** Komar. Shrub to 2 m.; young brts. with 2 rows of curly hairs: lvs. subsessile, ovate- to oblong-lanceolate, 2–5 cm. long, acute or acuminate, obtusely serrate, sparingly ciliate and sometimes with a few hairs on midrib beneath, membranous: corolla purple pink, 2–2.5 cm. long, puberulous outside. Manch. Intr. about 1910?

10. **D. Middendorffiàna** Carr. Shrub to 1.5 m.; young brts. with 2 rows of hairs: lvs. subsessile or sessile, ovate-oblong to ovate-lanceolate, 5–8 cm. long, acuminate or acute, cuneate or rounded at base, serrulate, bright green, pilose on veins above and below, rarely nearly glabrous: peduncles 1–3-fld. in terminal cyme; corolla campanulate-funnelform, 3–3.5 cm. long, glabrous, sulphur-yellow, dotted orange on lower lobes; calyx 2-lipped, longer than the narrow portion of corolla, its upper lip with spreading lobes: caps. glabrous. Fl.v–vi. B.M.7876(c). Gt.6:t.183(c). F.S.11:t.1137(c). G.C.III.7:581. Manch., N. China, Japan. Intr. 1850. Zone IV.—Var. **bícolor** Rehd. Lower lip of corolla marked and dotted with purple. Gt.6:t.183(upper 2 fls., c). —Shrub with handsome fls., but usually not thriving well in cult.; it demands a cool and moist situation, sheltered from strong winds.

D. M. × (*florida* × *coraeensis*) = **D. Wàgneri** Kusnetz. Lvs. ovate-oblong, glabrous except on veins beneath; sepals lanceolate, distinct or partly connate; corolla pink, tinged yellow. Gt.48:t.1461(c). Orig. about 1890.

A closely related species is **D. Maximowíczii** Mak. Lvs. smaller and narrower, often obovate-oblong, usually more pubescent: fls. sessile; corolla greenish yellow, its tubular portion slenderer, exceeding the calyx-lobes; style and stamens exserted. N.T.1:500. (*D. Middendorffiana* var. *M.* S. Moore.) Japan. Intr. 1915. Zone V.

A large number of garden forms, mostly of hybrid origin, are in cult. for which the collective name *D. hybrida* Voss. has been proposed. They are hybrids between the species Nos. 4–9 and the best known are enumerated below under their probable parents, though some are probably ternary and even quaternary hybrids.

4 × 6. *D. florida* × *coracensis:* Mme. Couturier, Mme. Lemoine, Marc Tellier, Candida, André Thouin, Gustave Mallet, Venosa.
4 × 7. *D. florida* × *hortensis:* Montblanc, Pavillon Blanc, Abel Carrière, Conquête, Dr. Bulliard, Gratissima, Intermedia, Stelzneri, Vanhouttei.
4 × 8. *D. florida* × *floribunda:* Hendersonii, Lowei, P. Duchartre.
4 × ?. *D. florida* × ?: Isoline, Groenewegenii.
5 × ?. *D. praecox* × ?: Avalanche, Gracieux, Vestale, Conquérant, Espérance, Seduction.
6 × 7. *D. coraeensis* × *hortensis:* Dame Blanche.
6 × 8. *D. coraeensis* × *floribunda:* Othello, Styriaca, Congo, E. André, Eva Rathke, Lavallei.
7 × 8. *D. hortensis* × *floribunda:* Desboisii.

9. **LONÍCERA** L. HONEYSUCKLE. Deciduous, rarely half-evergreen or evergreen shrubs, rarely tree-like, upright or climbing; winter-buds with several or 2 outer scales: lvs. opposite, usually short-petioled, sometimes sessile, entire, rarely lobed, exstipulate, rarely with intrapetiolar stipules: fls. in axillary peduncled pairs, each pair with 2 bracts and 4 bractlets, the latter often connate, rarely wanting, or fls. in sessile whorls; calyx 5-toothed, corolla with slender or short, often gibbous tube, 2-lipped or nearly equally 5-lobed; stamens 5; ovary inferior, 2–3- rarely 5-celled; the pairs sometimes partly or wholly connate; style slender with capitate stigma: fr. few- to many-seeded. (After Adam Lonicer or Lonitzer, a German physician and botanist; 1528–1586.) Including *Caprifolium* Adans., *Periclymenum* Mill., *Xylosteum* Mill., *Chamaecerasus* Med., *Distegia* Raf., *Nintooa* Sweet. About 180 species throughout the n. hemisphere; in Am. s. to Mex., in the Old World to N. Afr., Java and the Philippines.—Ornamental shrubs, grown for their attractive fls. and frs.; about 100 species have been intr. into cult.

Fls. in pairs, rarely solitary: lvs. always distinct.
A. Brs. with solid white pith.
B. Corolla with regular or nearly regular 5-lobed limb.
C. Corolla equal at base, not ventricose; bractlets connate, at least half as long as ovary: lvs. not or slightly exceeding 3 cm. in length, conduplicate or flat in bud.
D. Stamens and style included.
E. Style half as long as corolla-tube: fr. red.
F. Ovaries connate, 2-celled. . . . . 1. *L. Myrtillus*
FF. Ovaries distinct, 3-celled.
G. Corolla outside and lvs. beneath glabrous. . . . . 2. *L. syringantha*
GG. Corolla pubescent outside: lvs. pubescent or tomentose beneath, rarely glabrous on sterile shoots. . . . . 3. *L. thibetica*
EE. Style as long as corolla-tube: fr. black. . . . . 4. *L. tomentella*
DD. Stamens and style exserted: fr. whitish or pale purple, bloomy: lvs. linear. 5. *L. spinosa*
CC. Corolla ventricose or saccate at base: lvs. convolute.
D. Bracts narrow, usually subulate.
E. Ovaries not inclosed by a cupula.
F. Bractlets connate or wanting; ovary usually 2-celled.
G. Ovaries connate or partly connate.
H. Bractlets present: fr. bluish black.
I. Corolla purple, 1.5 cm. long: lvs. pubescent beneath. 6. *L. purpurascens*
II. Corolla whitish, 1 cm. long: lvs. glabrous. . . . . 7. *L. obovata*
HH. Bractlets wanting: fr. red.
I. Corolla ventricose at base; lvs. to 3 cm. long, glabrous beneath. 8. *L. tangutica*
II. Lvs. saccate at base: lvs. to 5 cm. long, pubescent beneath. 9. *L. saccata*
GG. Ovaries distinct or nearly so: corolla gibbous at base.
H. Style exceeding the limb: fls. whitish, in pairs. . . . . 11. *L. canadensis*
HH. Style shorter than limb; fls. red, solitary.
I. Lvs. and fls. glabrous. . . . . 12. *L. gracilipes*
II. Lvs. and fls. glandular-pubescent. . . . . 13. *L. tenuipes*
FF. Bractlets distinct, acute, half as long as ovaries. . . . . 25. *L. pyrenaica*
EE. Ovaries enclosed by a cupula, distinct.
F. Fr. blue, bloomy, consisting of a fleshy cupula, tightly enclosing the ovaries, these therefore seemingly connate: lvs. deciduous. . . . . 14. *L. coerulea*
FF. Fr. pale purple, splitting at maturity the dry cupula: lvs. half-evergreen, lustrous. . . . . 15. *L. pileata*
DD. Bracts large, more or less enveloping the ovaries.

EE. Bractlets wanting: fls. white: fr. red: terminal winter-bud wanting.
F. Winter-buds with 2 outer scales, acute.
G. Ovaries glabrous or glandular: corolla with slender gibbous tube.
22. *L. hispida*
GG. Ovaries setose and glandular-pilose; corolla-tube stout, saccate.
23. *L. chaetocarpa*
FF. Winter-buds with several outer scales, small, obtuse....24. *L. strophiophora*
EE. Bractlets large: fls. yellow to scarlet: fr. purple-black.
F. Stamens as long as limb: lvs. glabrous or slightly pubescent.26. *L. involucrata*
FF. Stamens not exceeding the mouth of the tube: lvs. pubescent beneath.
27. *L. Ledebourii*

BB. Corolla 2-lipped.
C. Winter-buds with 2 outer scales: fls. white or yellowish.
D. Ovaries enclosed by a cupula: terminal winter-bud present.
E. Lvs. acuminate, to 10 cm. long....16. *L. Ferdinandi*
EE. Lvs. obtuse, to 4 cm. long....17. *L. iberica*
DD. Ovaries not inclosed by a cupula: terminal bud wanting.
E. Lvs. acuminate; brts. setose....18. *L. Standishii*
EE. Lvs. obtusish or acute: brts. glabrous....19. *L. fragrantissima*
CC. Winter-buds with several outer scales.
D. Tube of corolla about as long as limb: lvs. 1–2.5 cm. long....8. *L. microphylla*
DD. Tube much shorter than limb: lvs. larger.
E. Winter-buds ovoid, terete, with ovate obtuse rarely lanceolate scales; peduncles long (except in No. 16); calyx with obtuse or obsolete teeth: fr. red.
F. Bractlets connate into a cupula as high as ovaries....16. *L. gynochlamydea*
FF. Bractlets distinct or wanting.
G. Ovaries partly or wholly connate.
H. Corolla finely pubescent outside, yellowish: lvs. obtusish.
28. *L. oblongifolia*
HH. Corolla glabrous or pilose outside, usually tinged purple: lvs. acuminate.
29. *L. alpigena*
GG. Ovaries distinct.
H. Corolla yellowish, tinged purplish: lvs. more or less glandular, to 12 cm. long....30. *L. Webbiana*
HH. Corolla dark purple: lvs. pilose, not glandular, 3–6 cm. long.
31. *L. tatsienensis*
EE. Winter-buds oblong-ovoid, acute, 4-angled, with acute lanceolate scales, persistent at base of brts.: fls. yellowish to lilac.
F. Fr. red.
G. Peduncles much longer than petioles.
H. Bracts caducous, bractlets, minute or indistinct....32. *L. conjugialis*
HH. Bracts persistent; bractlets at least ¼ as long as ovaries.
I. Lvs. distinctly petioled, acute to acuminate.
J. Lvs. green and glabrescent or pubescent beneath.
33. *L. Maximowiczii*
JJ. Lvs. grayish tomentulose beneath....34. *L. Tatarinovii*
II. Lvs. subsessile, rounded at base, obtuse, rarely acute..35. *L. Chamissoi*
GG. Peduncles shorter than petioles: fls. 4-merous, whitish....36. *L. subsessilis*
FF. Fr. black or bluish black.
G. Ovaries connate; bractlets connate into distinct pairs; peduncles often shorter than petioles....37. *L. orientalis*
GG. Ovaries distinct, rarely connate ½; bractlets connate into a short cupula; peduncles longer than petioles.
H. Peduncles not exceeding 1.5 cm.: lvs. glabrous....38. *L. nervosa*
HH. Peduncles 1.5–4 cm. long: lvs. pubescent beneath at least along midrib.
39. *L. nigra*

AA. Brts. hollow: ovaries distinct.
B. Habit upright.
C. Peduncles much longer than petioles.
D. Corolla light pink to rosy red, sometimes white, but not changing to yellow.
E. Bractlets distinct or nearly so; the 2 outer lobes of upper lip of corolla divided to base of limb....40. *L. tatarica*
EE. Bractlets of each fl. connate at base; lateral lobes of upper lip divided to the middle or slightly beyond: lvs. 1–4 cm. long....41. *L. Korolkowii*
DD. Corolla white, sometimes slightly tinged pinkish, changing to yellow or yellowish.
E. Winter-buds elongated, pointed, with long-ciliate pubescent scales.
F. Lvs. broad-ovate to obovate or elliptic, acute, soft-pubescent to glabrescent: fls. often tinged pink....42. *L. Xylosteum*
FF. Lvs. rhombic-ovate to ovate-lanceolate, acuminate, pilose or glabrescent: fls. yellowish white....43. *L. chrysantha*
EE. Winter-buds small, obtusish, glabrescent.
F. Ovary sparingly glandular and pilose; lvs. 1.5–3 cm. long, acute to obtusish.
44. *L. demissa*
FF. Ovary glabrous: lvs. 3–10 cm. long.
G. Bractlets about as long as ovary, pubescent; upper lip of corolla divided to base, with spreading lobes: lvs. acute to obtusish....45. *L. Morrowii*
GG. Bractlets small, glabrous or glandular-ciliate; upper lip divided about ½, upright: lvs. acuminate....46. *L. Ruprechtiana*

cc. Peduncles shorter or slightly longer than petioles: bractlets connate into pairs; calyx cup-shaped or campanulate, often splitting.
d. Fr. red.
e. Calyx divided to about the middle into ovate to lanceolate lobes; upper lip of corolla divided to about the middle into oblong lobes.....47. *L. Maackii*
ee. Calyx campanulate, with short, often indistinct teeth, becoming scarious, splitting; upper lip with short ovate lobes.
f. Lvs. acuminate, pubescent, 4–8 cm. long.....48. *L. deflexicalyx*
ff. Lvs. obovate to ovate, obtuse to acutish, glabrate, 3–5 cm. long.
49. *L. trichosantha*
dd. Fr. white, translucent, with blackish seeds; calyx cup-shaped, not splitting.
50. *L. quinquelocularis*
bb. Habit twining: fr. black: corolla-tube slender, not or only slightly ventricose.
c. Bracts, subulate.
d. Tube of corolla as long or slightly longer than limb: corolla not longer than 3 cm., yellowish red to purple red.
e. Corolla glabrous outside; lvs. glabrate.....41. *L. Henryi*
ee. Corolla densely pilose outside: lvs. pilose.....52. *L. Giraldii*
dd. Tube of corolla longer than limb, not ventricose; corolla 4–6 cm. long, deeply 2-lipped, white, changing to yellow.
e. Lvs. white-tomentose beneath, 4–9 cm. long.....53. *L. similis*
ee. Lvs. grayish pubescent beneath, 3–6 cm. long.....54. *L. confusa*
cc. Bracts leafy ovate: corolla white, changing to yellowish, often purplish outside.
55. *L. japonica.*

Fls. in usually 6-fld. sessile whorls at end of brts.; the pairs of lvs. below the whorls usually connate: fr. red; habit twining, rarely suberect.

a. Corolla with short, nearly regular or short-lipped limb; tube ventricose below the middle; stamens inserted below the mouth.
b. Floral whorls remote, forming a peduncled spike: lvs. not ciliate.....56. *L. sempervirens*
bb. Floral whorls 1–3, close, forming a peduncled head: lvs. ciliate.....57. *L. ciliosa*
aa. Corolla deeply 2-lipped; stamens inserted at mouth.
b. Corolla 1.5–2.5, rarely to 3.5 cm. long, ventricose or gibbous below the middle, pubescent inside (glabrous in No. 63); style usually pubescent.
c. Bractlets half as long as ovaries; corolla 1.2–1.8 cm. long, gibbous...58. *L. hispidula*
cc. Bractlets not more than ⅓ as long as ovaries.
d. Lvs. ciliate and pubescent beneath; brts. pubescent; corolla glandular outside.
59. *L. hirsuta*
dd. Lvs. not ciliate; brts. glabrous; corolla glabrous outside or sparingly pilose.
e. Disk of connate lvs. elliptic to oblong, pointed at ends, concave.
f. Corolla gibbous, 1.5–2 cm. long.....60. *L. dioeca*
ff. Corolla with slender tube, 2–3 cm. long.....61. *L. yunnanensis*
ee. Disk of connate lvs. suborbicular to oval, rounded at ends, nearly flat: corolla 2.5–3 cm. long.
f. Corolla inside and style pubescent: disk of lvs. glaucous above.
62. *L. prolifera*
ff. Corolla inside and style glabrous; disk bright green or slightly glaucous above.
63. *L. flava*
bb. Corolla 3.5–8 cm. long; tube slender; glabrous inside and style glabrous (except No. 64).
c. Floral whorls all or the lower ones in the axils of connate lvs., more or less remote.
d. Corolla-tube 3 to 4 times as long as limb; stamens much shorter than limb.
64. *L. implexa*
dd. Corolla-tube not more than 1½ as long as limb; stamens at least as long as limb.
65. *L. Caprifolium*
cc. Floral whorls in the axils of small bract-like lvs.
d. Lvs. below the infl. connate into a disk, rarely distinct and subsessile.
e. Infl. an elongated spike with remote whorls.....66. *L. Heckrottii*
ee. Infl. a dense head or short spike, or only of 1 or 2 whorls.
f. Bractlets rarely more than ⅓ as long as ovaries.
g. Floral whorls 1 or 2, glabrous, short-peduncled; corolla 7–8 cm. long.
67. *L. tragophylla*
gg. Floral whorls 3–5, sessile, glandular; corolla 4–6 cm. long.*68. L. splendida*
ff. Bractlets about as long as ovaries; floral heads long-peduncled, often in 3's.
69. *L. etrusca*
dd. Lvs. below the inflorescence distinct, petioled; whorls forming a dense head.
70. *L. Periclymenum*

Subgen. I. CHAMAECERASUS L. Upright or twining shrubs: lvs. always distinct: fls. in axillary pairs, sometimes reduced to 1 fl.

Sect. 1. Isoxylosteum Rehd. Upright, rarely prostrate shrubs; axillary buds solitary: lvs. usually small, conduplicate or nearly flat in bud: corolla regular, tubular or campanulate, 5-lobed, with 5, rarely 3 nectaries at base inside; bracts usually leafy; bractlets always present, usually connate into a cupula.

1. **L. Myrtíllus** Hook. f. & Thoms. Small shrub with slender brs. glabrous or slightly pubescent when young: lvs. very short-petioled, oval or ovate to oblong, 6–25 mm. long, dark green above, grayish green beneath, glabrous:

peduncle upright, short; bracts narrow-oblong, longer than calyx; corolla tubular-campanulate, 6–8 mm. long, yellowish white, glabrous; tube about twice as long as limb; cupula half as long as ovary: fr. orange-red, 6 mm. across. Fl.v–vi; fr.vii–viii. S.T.1:t.44. (*L. parvifolia* var. *M.* Clarke.) Afghan. to Sikkim. Cult. 1879. Zone (V).—Var. **depréssa** Rehd. Peduncle longer, sometimes as long as lf.; bractlets larger and broader, usually elliptic. S.L.252(h). (*L. d.* Royle, *L. parvifolia* Hook. f. & Thoms., not Hayne, nor Edgew.) Himal. Cult. 1910.

Related species are: **L. myrtilloïdes** Purpus. Young brts. glandular-pubescent: lvs. elliptic to ovate-oblong or narrow-oblong, 1–3 cm. long, sparingly pubescent at least on midrib: peduncles 1 cm. long, nodding; bracts narrow-oblong; cupula about as long as ovaries; corolla pubescent outside, fragrant. M.D.1907:255,t. S.H.2:f.436a-c,437b-c. Himal. Cult. 1907. Zone (V).—Possibly a hybrid between *L. Myrtillus* and *L. angustifolia*.—**L. angustifólia** Wall. Shrub to 3 m.; brts. pubescent: lvs. oblong to oblong-lanceolate, 2–5 cm. long, acuminate, pubescent beneath; peduncles 1–2 cm. long, nodding; bracts linear to lanceolate; corolla pinkish white, fragrant, glabrous or pubescent outside, often 4-merous; tube 3 times longer than limb. F.S.4:407, 408b. S.H.2:f.436f-g,437d. Kashmir to Sikkim. Intr. about 1849. Zone VII?

2. **L. syringántha** Maxim. Upright slender-branched shrub, to 2 or 3 m., glabrous: lvs. short-petioled, elliptic to oblong, 1–2.5 cm. long, obtusish or acutish: peduncle to 5 mm. long; bracts linear oblong, exceeding the calyx; cupula shorter than ovaries; calyx-teeth lanceolate, often longer than ovary; corolla tubular-campanulate, 1.2–1.5 cm. long, pinkish white to rosy-lilac, fragrant, tube 3–4 times as long as limb: fr. red. Fl.v–vi; fr.viii. B.M.7989. R.H.1907:281. Gn.89:126(h). N. W. China. Intr. about 1890. Zone V.—Var. **Wólfii** Rehd. Much branched shrub with partly prostrate brs.: lvs. narrower and more acute, to 3.5 cm. long; calyx-teeth more connate at base, ciliate; corolla carmine. S.H.2:f.436n-o,437h. Cult. 1900.—Handsome shrub with profusely produced fragrant fls.

3. **L. thibética** Bur. & Franch. Spreading shrub to 1.5 m., with slender partly prostrate brs. loosely tomentose when young: lvs. often in 3's, oblong-lanceolate, 1–3 cm. long, acute, rarely obtusish, dark green and lustrous above, white-tomentose beneath: peduncle to 1 cm. long; bracts linear-lanceolate, about as long as calyx, bractlets about half as long as ovaries, glandular-ciliate; corolla tubular-campanulate, 1–1.5 cm. long, pale purple, pubescent outside, tube 2 or 3 times as long as limb; style half as long as corolla-tube: fr. red, ellipsoid, about 6 mm. long. Fl.v–vi; fr.viii–ix. S.T.1: t.45. R.H.1902:449. B.S.2:57. (*L. rupícola* var. *t.* Zab.) W. China. Intr. 1897. Zone V.—Handsome shrub suited for planting on rocky slopes.

A closely related species of similar habit is **L. rupícola** Hook. f. & Thoms. Young brts. slightly villous or glabrous: lvs. ovate-oblong to oblong, 1.2–2.5 cm. long, obtuse or acutish, bluish green above, grayish green and pubescent beneath or nearly glabrous: fls. pale purple, pubescent outside. S.H.2:f:436k-l,437f. Himal. Cult. 1888. Zone VI or VII.

4. **L. tomentélla** Hook. f. & Thoms. Upright shrub to 2 m.; brts. pubescent: lvs. elliptic to ovate-oblong, 1–3.5 cm. long, obtusish or acute, dull green above, pubescent beneath: fls. short-stalked, nodding; bracts linear-oblong; bractlets about half as long as the partly or wholly connate ovaries; calyx-lobes triangular-ovate, short; corolla tubular-funnelform, about 1.5 cm. long, pinkish white, pubescent outside; style as long as corolla-tube: fr. blue-black. Fl.vi. B.M.6486(c). Sikkim. Intr. 1849. Zone VII?

5. **L. spinòsa** Jacquem. Low shrub with rigid spinescent brs.; glabrous: lvs. linear-oblong, 1.5–2.5 cm. long, often with 2 teeth at base: peduncles upright to 1 cm. long; bracts linear; ovaries usually connate only at base; cupula

about half as long; corolla tubular-funnelform, glabrous outside, with slender tube, lobes ovate; filaments about as long as anthers. Jacquemont, Voy. Inde, 4:t.86. N. W. Himal. Not in cult.—Var. **Albérti** Rehd. Low shrub with slender arching or often prostrate brs.: lvs. to 3 cm. long, often with 2–4 teeth at base, glaucous or bluish green: corolla rosy-pink, fragrant, tube slender, about 1 cm. long; stamens nearly as long as lobes; filaments much longer than anthers: fr. pale bluish red or whitish, bloomy, about 8 mm. across. Fl.VI; fr.VIII. B.M.7594(c). Gt.30:t.1065(c). (*L. A.* Reg.) Turkest. Intr. about 1880. Zone V.—Graceful shrub very distinct with its narrow bluish green lvs. and the rosy pink fls.

Sect. 2. ISIKA DC. Upright or rarely prostrate shrubs; accessory superposed buds often present; pith solid or evanescent: lvs. involute or convolute in bud: corolla more or less irregular, usually 2-lipped, sometimes with regular limb, but tube ventricose or gibbous with 1–3 nectaries: bractlets either distinct or connate, sometimes wanting: ovary 2–3-, rarely 5-celled.

6. **L. purpuráscens** Walp. Shrub to 3 m.; brts. pubescent: lvs. ovate to oblong or obovate-oblong, 2–4 cm. long, obtuse or acute, sparingly pubescent or nearly glabrous above, pubescent beneath: fls. nodding, on slender stalks; brats linear-lanceolate, longer than ovaries; bractlets glandular-ciliate, ⅓ as long as ovaries; corolla tubular-funnelform, 1.5 cm. long, dull purple, pubescent outside, gibbous at base: ovaries ⅓ connate; stamens as long, style longer than limb: fr. blue-black. Fl.v. Jacquemont, Voy. Inde,4:t.87. Sikkim to Afghan. Cult. 1894. Zone VI?

7. **L. obovàta** Royle. Shrub to 2 m., glabrous: lvs. obovate, 5–12 mm. long, obtuse or acutish, cuneate, whitish beneath: fls. nodding on short stalks; bracts about as long as ovaries; bractlets ⅓ as long as the connate ovaries; corolla 1 cm. long, glabrous outside, whitish; stamens as long, style longer than limb: fr. blue-black, short-ellipsoid. Fl.v. S.H.2:f.439a-d,440e. (*L. parvifolia* Edgew., not Hayne.) Sikkim to Kashmir and Afghan. Cult. 1894. Zone V.

8. **L. tangùtica** Maxim. Low shrub, with slender spreading brs.; brts. glabrous: lvs. obovate to elliptic- or obovate-oblong, 1.5–3 cm. long, acute or obtusish, cuneate, ciliate, usually sparingly hairy above, whitish beneath and glabrous: fls. pendulous on slender stalks 1.5–3 cm. long; bracts subulate, about as long as ovaries; corolla tubular-funnelform, 1–1.4 cm. long, slightly ventricose at base, glabrous outside, yellowish white, tinged pink; stamens shorter than limb, style longer, usually glabrous; ovaries usually connate ½: fr. scarlet. Fl.v–VI; fr.VII. Gt.40:581. S.H.2:f.439m-o,440i. W. China. Cult. 1890. Zone IV? or V.—Particularly attractive in summer with its pendulous scarlet fr.

Closely related species are: **L. szechuànica** Batal. Lvs. obovate, 8–25 mm. long, obtuse, quite glabrous: peduncles 5 mm., rarely 2 cm. long; bracts subulate, slightly longer than the connate ovaries; style glabrous. S.H.2:f.439h-i,440g. W. China. Intr. 1908. Zone V.—**L. Schneideriàna** Rehd. Lvs. obovate to oblong-obovate 1–2.5 cm. long, obtuse, quite glabrous: peduncles about 2.5 cm. long; bracts subulate, scarcely half as long as ovaries; corolla slightly gibbous; stamens slightly exceeding the limb; style pubescent. S.H.2:f.439k-l,440h. W. China. Intr. 1911. Zone V.

9. **L. saccàta** Rehd. Upright shrub to 1.5 m.; brts. glabrous: lvs. oblong-elliptic to oblong, 1.5–5 cm. long, obtuse, cuneate, glabrous above or sparingly pubescent at first, pubescent beneath, becoming glabrous except on the veins: fls. nodding on slender stalks 1–2.5 cm. long; bracts narrow-oblong, exceeding the calyx; corolla tubular-funnelform, 1.2–1.5 cm. long, whitish tinged pink, saccate at base; stamens about as long as limb, style longer, pubescent below

the middle: fr. scarlet. Fl.v; fr.vi. S.T.1:t.20. C. and W. China. Intr. 1910. Zone V.

10. **L. microphýlla** Willd. Much-branched shrub, to 1 m.; brts. glabrous: or puberulous: lvs. obovate to elliptic or oblong, 1–2.5 cm. long, obtuse or acutish, puberulous on both sides, sometimes glabrate: fls. upright or nodding, on stalks 5–15 mm. long; bractlets subulate, usually slightly longer than calyx; bractlets wanting; calyx indistinctly 5-toothed; corolla 2-lipped, about 1 cm. long, yellowish white, glabrous or puberulous; limb about as long as the gibbous tube; upper lip divided to the middle; stamens and style scarcely as long as limb: berries usually wholly connate, orange-red. Fl.v; fr.vi–vii. Ledebour, Ic. Pl. Ross.t.213. S.H.2:f.441a-c,440l. (*L. Sieversiana* Bge.) C. Asia. Intr. 1818. Zone V.

11. **L. canadénsis** Marsh. Fly-H. Shrub with spreading brs., to 1.5 m.; brts. glabrous: lvs. ovate to ovate-oblong, 4–8 cm. long, acute, rounded to cordate at base, ciliate, slightly pubescent beneath at first; petiole 5–8 mm. long: fls. nodding on slender stalks 2–2.5 cm. long; bracts subulate, not exceeding the calyx; bractlets ciliate, small, sometimes obsolete; corolla tubular-funnelform, 1.5–2 cm. long, yellowish white, often tinged reddish, glabrous outside, strongly gibbous at base; stamens slightly, style much exceeding the limb: berries red, connate only at base. Fl.iv–v; fr.vi. Torrey, Fl.N.Y.t.42(c). B.B.2:381. (*L. ciliata* Muhlenb.) Que. to Sask., s. to Pa., Mich., Wisc. and Minn. Intr. 1824. Zone III or II.

A closely related species is **L. utahénsis** S. Wats. Lvs. broad-ovate to oblong, obtuse, usually rounded at base, not or only slightly ciliate near base: corolla shorter, slightly gibbous. S.H.2:f.440n(l). B. C. to Ore., Utah and Wyo. Intr. 1904. Zone V.

12. **L. gracílipes** Miq. Upright shrub to 2 m., with spreading brs.; young brts. glabrous or slightly pubescent: lvs. short-petioled, broad-ovate or rhombic-ovate to elliptic, 3–7 cm. long, acute or acutish, rounded at base, bright green above and usually with reddish margin, slightly ciliate when young, light bluish green and slightly pubescent beneath at first; vigorous brs. often with interpetiolar roundish stipules: fls. usually solitary, pendulous on slender stalks 2–3 cm. long; bracts subulate, unequal; bractlets minute; corolla funnelform, enlarged above the middle, 1.5 cm. long, pink to carmine, glabrous outside; stamens about half as long as the ovate-oblong lobes; style slightly shorter than lobes: berries ellipsoid, scarlet. Fl.iv–v; fr.vi. S.I.2: t.73(c). G.F.10:265. B.C.3:1907. (*L. uniflora* Bl., *L. Philomelae* Carr.) Japan. Intr. about 1870. Zone V.—The form described is var. *glabra* Miq.; the typical form has ciliate lvs. pubescent beneath, particularly on the midrib and is apparently not in cult.—Var. **albiflòra** Maxim. Fls. white.—Handsome and distinct species, one of the earliest to bloom; very attractive in fr.

13. **L. tenúipes** Nakai. Shrub to 2 m.; brts. pilose or nearly glabrous, changing to red- or yellow-brown: lvs. elliptic or elliptic-ovate to ovate- or obovate-oblong, 3–6 cm. long, pilose above, densely pilose beneath with brown hairs; petiole pilose and glandular: fls. usually solitary on slender pedicels 1–2 cm. long and pilose and stipitate-glandular; bracts pilose and sparingly glandular, usually only one developed; calyx glandular-ciliate; corolla 1.2–1.8 cm. long, red, pilose outside, gibbous at base; ovary glandular; stamens shorter, the pilose style nearly as long as lobes: fr. ellipsoid, red. Fl. iv–v; fr.vi. N.T.1:475. (*L. gracilipes* var. *glandulosa* Maxim.) Japan. Intr. 1915. Zone V.

14. **L. coerùlea** L. Much-branched upright or spreading shrub, to 1.5 m.: brts. glabrous or pubescent, later yellowish or red-brown, with flaky bark;

winter-buds spreading, with 2 outer scales; vigorous brs. often with interpetiolar stipules: lvs. roundish ovate or oval to ovate-oblong or oblong, 2–8 cm. long, acute to obtusish, usually rounded at base, at least slightly pubescent when young, rarely quite glabrous, bright green: fls. on short nodding stalks; bracts subulate, exceeding the short-ciliate calyx; corolla tubular-funnelform, 1.2–1.5 cm. long, yellowish white, usually pubescent outside, with gibbous tube usually longer than the oblong upright-spreading lobes; stamens longer than limb; style longer than stamens, glabrous: fr. subglobose to ellipsoid, 6–12 mm. long, dark blue, bloomy. Fl.IV–V; fr.VI. B.M.1965(c). R.I.17:t.124,f.1 (c). F.D.28:t.2819(c). N. and C. Eu., N. Asia to Japan. Long cult. Zone III?—Very variable.—Var. **glabréscens** Rupr. Brts. glabrous or puberulous, yellowish brown: lvs. usually oblong, 3–6 cm. long, pubescent when young or at least ciliate; corolla with rather short thick tube glabrous outside. Eu. to N. E. Asia. This is the typical form—Var. **depéndens** Reg. Brts. red-brown, glabrous or nearly so: lvs. elliptic, 1.5–3 cm. long, ciliate, pubescent when young; corolla with slender pubescent tube. Turkest.—A form of this is var. **graciliflòra** Dipp. Upright shrub with red-brown brs.: lvs. ovate to ovate-oblong, 2–4 cm. long, bluish green, finely pubescent on both sides; corolla with slender tube: fr. oblong. Turkest. (*L. Karelini* Hort., not Bge.) —Var. **altâica** Sweet. Upright shrub with hirsute brts.: lvs. elliptic to oblong, 4–7 cm. long, pilose on both sides; stamens slightly or not exceeding the limb; corolla pubescent outside: fr. subglobose. Ledebour, Icon. Pl. Ross.2:t.131. (*L. Pallasii* Ledeb.) N. Eu. to Japan.—Var. **edûlis** Reg. Brts. pubescent: lvs. oblong to lanceolate, pubescent; stamens longer than limb: fr. oblong. Bull. Soc. Nat. Mosc.53,1:t.3,f.1–2. E. Siberia. Tibet.

Related species are: **L. villòsa** Roem. & Schult. Low shrub, with upright or ascending brs. and winter-buds; accessory buds and stipules wanting; brts. tomentose or densely short-pilose: lvs. densely villous on both sides: corolla tubular-campanulate, villous or pilose outside; tube as long or shorter than limb: fr. blue, edible. (*L. coerulea* var. *v.* Torr. & Gr., *L. coerulea* Am. auth., not L.) Lab. to Pa., Minn. and Man. Intr. ? Zone I.—The type occurs from Lab. and Que. to N. H. and is probably not in cult.; the following vars. are less pubescent and have a glabrous or rarely pilose corolla: Var. **Solònis** Fern. Young brts. pilose and puberulous: lvs. pilose beneath. Cult. 1871.—Var. **calvéscens** Fern. Brts. puberulent: lvs. pilose to glabrate beneath.—Var. **tônsa** Fern. Brts. glabrous: lvs. sparingly pilose to glabrous beneath. Cult. 1889.—**L. cauriàna** Fern. Shrub to 1.5 m., with upright or ascending brs.: lvs. narrow-obovate to oblong, 2–9 cm. long, villous-ciliate on margin and veins beneath: corolla slightly 2-lipped, pilose: fr. red. Wyo. to Wash. and Calif. Intr. ?

15. **L. pileàta** Oliv. Evergreen or half-evergreen low shrub, with spreading sometimes prostrate brs.; brts. pubescent: lvs. ovate to oblong-lanceolate, 5–40 mm. long, obtusish, dark green and lustrous above, pale green and sparingly pubescent on midrib beneath or glabrous, sparingly ciliate: fls. short-stalked, upright, fragrant; bracts subulate, as long as ovaries or longer and oblong; calyx with a cap-like downward production at base covering the rim of the cupula; corolla funnelform, 8 mm. long, whitish, glandular-pubescent or glabrous outside, gibbous at base; stamens and style exceeding the limb: fr. violet-purple or amethyst color. Fl.IV–V; fr.X. B.M.8060(c). G.C. III.47:236;68:195(fr). H.I.16:1585. C. and W. China. Intr. 1900. Zone (V).—Low shrub with handsome evergreen foliage.

A closely related species is **L. nítida** Wils. Upright shrub to 2 m.: lvs. broad-ovate to ovate-oblong, 6–12 mm. long, subcordate to broad-cuneate: fls. slightly larger. G.C.III.71:137(h). Gn.89:163(h). H.B.2:517(h). W. China. Intr. 1908. Zone VII or VIII?

16. **L. gynochlamýdea** Hemsl. Deciduous upright shrub; brts. glabrous, usually purplish: lvs. oblong-lanceolate to narrow-lanceolate, 5–10 cm. long,

acuminate, cuneate or rounded at base, pubescent on the midrib on both sides or sometimes villous beneath along the midrib: fls. upright, short-stalked; bracts subulate, about as long as ovaries; calyx and cupula as in No. 15; corolla 2-lipped, 8–12 mm. long, white, tinged pink, pubescent outside; tube stout, gibbous at base, shorter than limb; stamens longer than limb, style shorter, pilose: berries pale purple to white, distinct; seeds nearly black. Fl.v; fr.ix–x. S.H.2:f.441p-r,442g. W. China. Intr. 1907. Zone V.

17. **L. Ferdinándi** Franch. Upright shrub, to 3 m., with spreading brs.; brts. setose; interpetiolar stipules often present on vigorous brs.: lvs. ovate to lanceolate, 3–5.5 cm. long, acuminate, rounded to broad-cuneate at base, ciliate, dark green and sparingly strigose or nearly glabrous above, lighter green beneath and hirsute along the veins: fls. on short stalks; bracts ovate, short-petioled about 1 cm. long, ciliate; cupula urceolate, villous, adhering by matted hairs to the base of the calyx; corolla 2-lipped, 1.5–2 cm. long, glandular-pubescent and usually reflexed-setose outside; tube gibbous at base, about as long as limb: berries distinct, bright red surrounded by the split cupula. Fl.v–vi; fr.ix. Nouv. Arch. Mus. Paris,II.6:t.12. N. China. Intr. 1910. Zone V.—Var. **leycesterioïdes** Zabel. Brts. nearly glabrous: lvs. oblong-ovate to lanceolate, 4–7 cm. long: corolla not or slightly setose. S.H. 2:f.443c-e. (*L. l.* Graebn.) Cult. 1900. Zone V.—Var. **indûta** Rehd. Brts. densely villous and pilose: lvs. 3–7 cm. long, rounded to cordate at base, soft-pubescent beneath: corolla not setose, with rather slender, scarcely gibbous tube. N. China. Intr. 1923.

A closely related species is **L. vesicària** Komar. Brts. stout, setose, otherwise glabrous: lvs. subcoriaceous, ovate to ovate-oblong, 5–10 cm. long, truncate or rounded at base, glabrous except sparingly setose above, setose on midrib and veins beneath and ciliate; petiole 3–10 mm. long: bracts ovate to oblong, acuminate, 1.5 cm. long; corolla reflexed-setose; cupula split finally by the red berries. R.Mo.14:t.10. Korea. Cult. 1924. Zone V?

18. **L. ibèrica** Bieb. Densely branched shrub to 2 m.; brts. pubescent: lvs. orbicular-ovate to ovate, 2–3.5 cm. long, acute or acutish, rounded to cordate at base, ciliate, hairy on both sides: fls. short-stalked, at end of short brts.; bracts elliptic to ovate-oblong, about twice as long as ovary; cupula urceolate, glandular-pubescent; corolla 2-lipped, yellowish white, 1.2 cm. long, finely pubescent; tube gibbous at base, about as long as limb, upper lip with short broad lobes; stamens and the pubescent style as long as limb: berries distinct, 6–7 mm. across, bright red, surrounded by the split cupula. Fl.vi; fr.ix. Bieb. Cent. Pl. Ross.1:t.13. S.H.2:443f-i,444b. Transcauc., Persia. Intr. 1824. Zone V.—Var. **microphýlla** Dipp. Lower: lvs. 1.5–2 cm. long. S.H.2:f.444c—Dense round shrub, particularly attractive in fr.

19. **L. Standíshii** Carr. Half-evergreen upright shrub to 2 m., with short spreading brs.; brts. reflexed-setose, rarely nearly glabrous; winter-buds with 2 outer acuminate scales: lvs. ovate-oblong to lanceolate, 4.5–10 cm. long, acuminate, rounded at base, setose-ciliate, setose on both sides, more densely so and lighter green beneath, sometimes glabrescent above: fls. fragrant, on setose stalks 5–10 mm. long; bracts linear-lanceolate, ciliate, pubescent, about twice as long as ovaries; bractlets obsolete; ovaries connate about ½, with short indistinctly toothed calyx; corolla 2-lipped, 1.5 cm. long, white, pilose, upper lip divided beyond the middle into oblong lobes longer than the gibbous tube; stamens and style shorter than limb: berries oblong, red, partly connate. Fl.iii–iv; fr.vi. B.M.5709(c). G.C.III.5:245;64:224. R.H.1873:148. (*L. Fortunei* Hort.) China; rarely escaped (L. I.). Intr. about 1845. Zone (V). —Var. **lancifòlia** Rehd. Brts. glabrous: lvs. narrow-lanceolate, 4–8 cm. long

and 1–2.2 cm. broad. G.C.III.67:101. R.H.1916:24. (*L. pseudoproterantha* Pamp.) Intr. 1907.—Chiefly valued like the following species for its early fragrant fls.

L. S. × *fragrantissima* = *L. Purpusii;* see under No. 20.

20. **L. fragrantíssima** Lindl. & Paxt. Half-evergreen shrub, closely related to the preceding species: with more spreading longer, sometimes recurving brs.; brts. glabrous or nearly so, usually bloomy when young: lvs. very short-petioled, elliptic to broad-ovate or obovate, 3–7 cm. long, acute, setose-ciliate, dark green and glabrous above, pale bluish green and setose on the midrib beneath; pedicels glabrous; bracts glabrous or slightly pubescent; corolla glabrous outside, with somewhat shorter, more gibbous tube. Fl.III–IV. fr.VI. B.M.8585(c). G.C.III.5:245. R.H.1873:169. (*L. caprifolioides* K. Koch, *L. Magnevilleae* Hort., *L. odoratissima* Hort.) E. China. Intr. about 1845. Zone (V).

L. f. × *Standishii* = **L. Purpùsii** Rehd. Brts. glabrous or slightly setose on vigorous shoots: lvs. more like those of No. 19 but glabrous or nearly so: fls. glabrous or nearly so. Gt.75:165,166(h). Orig. before 1920.

21. **L. Altmánnii** Reg. Shrub to 2 m., with spreading brs.; brts. pubescent and hispid; winter-buds with 2 outer scales: lvs. broad-ovate to ovate-elliptic, 1.5–5 cm. long, acute, rarely obtusish, rounded to subcordate at base, ciliate, hirsute to glabrous above, paler, soft-pubescent and hirsute beneath; petiole 5 mm. long, pubescent: fls. on upright pubescent stalks 3–5 mm. long; bracts ovate-lanceolate, 2 to 3 times as long as the glandular and sometimes hairy ovary; calyx-teeth short, triangular; corolla 2-lipped, 1.5 cm. long, sparingly hairy and glandular; tube gibbous, as long or slightly longer than limb, upper lip divided about ½; style and stamens glabrous, as long or nearly as long as limb; berries distinct, globose-ellipsoid, 7–8 mm. across, orange-red. Fl.V; fr.VI–VII. S.H.2:f.445a-b,446a. (*L. tenuiflora* Reg. & Winkl.) Turkest. Intr. ?—Var. **pilosiúscula** Rehd. Lvs. only sparingly hirsute; ovaries glabrous and corolla often glabrous. Intr. about 1900.—Var. **hírtipes** Rehd. Brts. and petioles densely setose: lvs. larger, more densely hirsute. Isv. St. Peterb. Lesn. Inst.3:t.11,f.4. Cult. 1910.—Attractive in fr.

Related species are **L. Olgae** Reg. & Schmalh. Brts. glabrous: lvs. ovate to lanceolate, 1.5–6 cm. long, setose-ciliate, glabrous beneath, sometimes sparingly appressed-setose above, bluish green, thickish: corolla glabrous; stamens and style shorter than limb. S.H.2:f.445c-e,446b. Turkest. Cult. 1907. Zone V.—**L. bracteolàris** Boiss. & Buhse. Brts. glabrous: lvs. short-stalked, ovate to ovate-oblong, 2.5–6 cm. long, obtuse or acutish, glabrous or sparingly ciliate: corolla glabrous, tube as long or nearly as long as limb; stamens slightly shorter, style longer. S.H.2:f.445f-h,446c. Transcauc. Cult. 1910. Zone V.

22. **L. híspida** Pall. Upright shrub to 1.5 m.; brts. hispid, rarely glabrate; winter-buds large, with 2 outer scales: lvs. elliptic to ovate-oblong or oblong, 3–8 cm. long, acute or acuminate, rounded or broad-cuneate at base, setose-ciliate, dark green and glabrous above or sparingly hirsute, lighter green or glaucescent beneath, usually glabrous or hispid on veins: fls. nodding, on hirsute stalks 1–1.5 cm. long; bracts ovate, 2–2.5 cm. long, ciliate, whitish; ovary oblong, usually glandular, rarely glabrous: corolla tubular-funnelform, 2.5–3 cm. long; rather abruptly enlarged above the middle, pilose, white or yellowish white; tube several times longer than the ovate spreading lobes of the regular limb; stamens nearly as long, style longer than limb: berries oblong, 1.5 cm. long, bright red. Fl.IV–V; fr.VI–VII. Ledebour, Icon. Pl. Ross.3:t.112. (*L. bracteata* Royle.) Turkest. to W. China and Kumaon. Intr. 1878. Zone V.—Var. **hirsùtior** Reg. Lvs. hirsute on both sides, usually ovate-oblong, mostly rounded at base. Turkest.

A related species is **L. subdentàta** Rehd. Brts. glabrous: lvs. oblong-ovate, 5–9 cm. long, occasionally with a few coarse teeth, sparingly hirsute; peduncles short, setose: fr. ovoid, sparingly setose; calyx-lobes setose-ciliate; fls. unknown. W. China. Intr. 1908. Zone (V).

23. **L. chaetocárpa** Rehd. Upright shrub to 2 m.; brts. hispid and glandular; winter-buds to 1 cm. long: lvs. oblong-ovate to oblong, rarely elliptic-ovate, 3.5–7.5 cm. long, acute or obtusish, hirsute above, more densely so and reticulate and grayish green beneath: fls. nodding on hirsute stalks 1–2 cm. long; bracts about 2.5 cm. long, acuminate, ciliate, hirsute on back; corolla tubular-funnelform, 3–4 cm. long, yellowish white, sparingly hirsute and glandular outside; tube stout, strongly saccate at base and gradually widened into the upright limb; ovaries densely stipitate-glandular and setose: fr. short-ellipsoid. Fl.v; fr.vii. B.S.2:45. S.H.2:f.445n-p,446e. (*L. hispida* var. *c.* Batal.) W. China. Intr. 1904. Zone V.

24. **L. strophiόphora** Franch. Shrub to 2 m.; brts. slender, pilose and glandular; winter-buds ovoid, with several outer scales: lvs. ovate to elliptic-ovate, 4–8 cm. long, acuminate, usually rounded at base, bright green, pilose on both sides, more densely beneath, sometimes glabrate above: fls. before the lvs., nodding, on pilose and glandular stalks 5–7 mm. long; bracts ovate, 1–1.5 cm. long, acuminate, ciliate, pilose on back; corolla tubular-funnelform, rather slender, about 2 cm. long, white, glabrous without and within; tube gibbous; stamens slightly shorter, style longer than limb; ovary hirsute and glandular: fr. subglobose, red, pilose. Fl.iii–iv; fr.vii. N.T.1:484. S.H.2:f. 447d-f,446g. (*L. pilosa* Maxim., not Willd.) Japan. Intr. 1915. Zone V.

A related species is **L. praeflòrens** Batal. Shrub to 1 m.: lvs. short-petioled, broad-ovate to ovate-elliptic, 4–6.5 cm. long, acute, pilose on both sides: fls. before the lvs., very short-stalked; bracts ovate to lanceolate, pilose; corolla 1–1.2 cm. long, divided below the middle, scarcely 2-lipped, quite glabrous, with short, scarcely gibbous tube; stamens and style slightly longer than the oblong lobes; anthers purple; ovary glabrous. N.K.11:28. Korea, Manch. Intr. 1917. Zone V.

25. **L. pyrenáica** L. Upright shrub to 1 m.; glabrous: lvs. oblong-obovate to oblong-oblanceolate, 2–4 cm. long, obtusish or acute, narrowed into the very short petiole, bluish green above, pale beneath: fls. nodding, on slender stalks 2.5–4 cm. long; bracts oblong-lanceolate, usually twice as long, bractlets ovate to oblong-ovate, acute, ½ as long as ovaries; corolla funnelform-campanulate, 1.5–2 cm. long, white, often flushed pink, gibbous at base, glabrous outside, with oval spreading lobes; stamens shorter, style slightly longer than limb: berries distinct, subglobose, red. Fl.v; fr.vii. B.M.7774(c). L.B.1361(c). B.S.2:53. Pyrenees and Balear. Isls. Intr. 1739. Zone (V). —Ornamental small shrub attractive in bloom.

26. **L. involucràta** Banks. Upright shrub to 1 m.; brts. glabrous, slightly angled: lvs. elliptic-ovate to oblong-lanceolate, 5–12 cm. long, acuminate, cuneate, bright green, glabrous or slightly pubescent beneath when young; petiole 3–12mm. long: fls. on upright glabrous stalks 1.5–3 cm. long; bracts ovate or broad-ovate, acute, glandular-pubescent, reaching to the middle of the corolla; bractlets large, exceeding the ovaries; corolla tubular 1–1.5 cm. long, with upright ovate lobes, yellow or slightly tinged red, glandular-pubescent outside; stamens as long as limb; style glabrous, slightly longer: berries globose, lustrous purple-black, surrounded by the enlarged bractlets and bracts, the latter finally reflexed. Fl.v–vi; fr.vi–vii. B.R.1179(c). B.B.3:282. (*Distegia i.* Cock.) Que. to Alaska and in the Rockies s. to Mex. —Var. **seròtina** Koehne. Lvs. nearly glabrous; corolla to 2 cm. long, orange-yellow flushed scarlet; bracts not reflexed in fr. Fl.vi–viii. Colo. Intr. 1903. —Var. **húmilis** Koehne. Dwarf, not exceeding ½ m.; brts. sparingly pubes-

cent: lvs. ovate-oblong, 4–6 cm. long, sparingly pubescent beneath; bracts green; stamens slightly longer than limb. Colo. Cult. 1903.—Var. **flavéscens** Rehd. Lvs. oblong- or ovate-lanceolate, 7–12 cm. long, light green, glabrous or nearly so: corolla gibbous, not saccate at base. Gt.37:7. D.H.1:260. (*L. f.* Dipp., *L. Webbiana* Hort., not Wall.) B. C. to Ore., Wyo. and Utah. Cult. 1880.—Chiefly valued for its conspicuous fr.; var. *serotina* is handsome and distinct in bloom.

27. **L. Ledebòùrii** Eschsch. Upright shrub, sometimes with sarmentose brs. to 5 m. long, closely related to the preceding species; brts. glabrous or sparingly pubescent: lvs. oblong or ovate-oblong to ovate-lanceolate, 6–12 cm. long, acuminate, broad-cuneate to rounded at base, dark green and slightly lustrous above, paler and pubescent beneath, thickish; petiole 3–5 mm. long: fls. on upright glabrous or pubescent stalks 2–4 cm. long; bracts broad-ovate, yellow or reddish, covering the base of the corolla; corolla 1.5–2 cm. long, orange and scarlet outside, with slightly spreading short lobes; stamens not exceeding the tube; style longer than limb. Fl.VI–VII; fr.VII–IX. B.M. 8555(c). Gt.2:289,t(c). (*Distegia L.* Greene.) Calif. Intr. 1838. Zone (V). —Handsomer than the preceding species, with dark green foliage and more showy fls.

L. L. × *alpigena* = **L. propínqua** Zabel. Known in two forms; one more like the first, the other like the second parent: corolla yellowish brown, 2-lipped, strongly gibbous; bracts slightly longer, bractlets half as long as the partly connate ovaries, glandular-pubescent. Orig. 1884.

28. **L. oblongifòlia** Hook. Swamp Fly-H. Upright shrub to 1.5 m.; brts. minutely pubescent: lvs. subsessile, elliptic-oblong to oblong-lanceolate, 3–8 cm. long, obtusish, abruptly narrowed at base, short-pubescent on both sides or glabrate above, bluish green above, grayish green beneath: fls. upright on slender stalks, about 2.5 cm. long; bracts small and caducous, bractlets obsolete; ovaries wholly or ½ connate; corolla deeply 2-lipped, 1–1.5 cm. long, yellowish white, upper lip with short lobes, longer than the gibbous tube; stamens shorter, style about as long as limb: fr. red. Fl.V; fr.VII. Hooker, Fl. Bor. Am.1:t.100. B.B.3:281. N. B. to Man., s. to Pa., Mich. and Minn. Intr. 1823. Zone II or I?—Var. **altíssima** Rehd. Glabrous or nearly so. Ann. Carnegie Mus.4:t.20. (*L. a.* Jennings.) Pa.

29. **L. alpígena** L. Upright shrub to 3 m., with gray brs.; young brts. slightly pubescent and glandular or glabrous: lvs. elliptic to oblong-obovate or oblong, 5–10 cm. long, acuminate, rounded to cuneate at base, dark green and glabrous above, lighter beneath and often slightly pubescent when young; petiole 1–1.5 cm. long: fls. upright on slender stalks 2–4.5 cm. long; bracts linear, about twice, and bractlets about ¼ as long as ovaries, glandular-ciliate; corolla 2-lipped, 1–1.5 cm. long, yellowish or greenish yellow, tinged dull red or brown-red, glabrous outside; tube strongly gibbous, much shorter than limb; stamens about as long as limb, style slightly longer; anthers red; ovaries more or less connate: fr. globose-ovoid, scarlet. Fl.V; fr.VIII–IX. G.H.1:t.10(c). R.I.17:t.1175,f.3,4(c). Mts. of C. and S. Eu. Cult. 1600. Zone V.—Var. **nàna** Nichols. Dwarf form: lvs. beneath and peduncles pubescent.—Very attractive in summer with its drooping scarlet frs.

L. a. × *Ledebourii* = *L. propinqua;* see under No. 27.

A related species is **L. Glèhnii** Fr. Schmidt. Brts., peduncles and petioles glandular-pubescent: lvs. usually rounded or subcordate at base, pubescent beneath: corella yellowish; anthers yellow. N.T.1:487. (*L. alpigena* var. *G.* Nakai.) Japan, Saghal. Intr. ?

30. **L. Wébbiana** Wall. Shrub to 3 m., with stout brs.; brts. glandular-pubescent or nearly glabrous: lvs. elliptic to ovate-oblong or oblong-lanceolate,

5–12 cm. long, acuminate, usually cuneate, pilose and glandular on both sides, sometimes nearly glabrous above; petiole 5–10 mm. long, glandular-pubescent: peduncles glandular-pubescent, 2.5–3 cm. long; bracts slightly or not longer than ovaries, glandular-ciliate like the ovate bractlets; corolla 1.5 cm. long, yellowish, tinged with red, sparingly pilose-glandular outside; tube thick, strongly gibbous, much shorter than limb; stamens about as long as limb, style shorter, pubescent: berries distinct, short-ellipsoid, scarlet. Fl.IV–V; fr. VIII–IX. S.T.1:t.69. (*L. alpigena* var. *W.* Nichols.) S. E. Eu., Afghan., Himal. Cult. 1885. Zone (V).

A related species is **L. heterophýlla** Dcne. Brts. glabrous: lvs. glabrous, sometimes irregularly lobed: corolla yellowish, tinged reddish, usually glandular and pilose outside. Himal.—In cult. only var. **Karelîni** Rehd. Lvs. usually not lobed, glandular on midrib on both sides. (*L. K.* Bge.) C. Asia. Cult. 1906. Zone V.

31. **L. tatsienénsis** Franch. Shrub to 2.5 m.; brts. glabrous; scales of winter-buds becoming reflexed: lvs. ovate or elliptic-ovate to oblong-lanceolate, 4–7 cm. long, acuminate, rounded to cuneate at base, on sterile vigorous shoots often deeply lobed, pilose on both sides or nearly glabrous; petiole 3–10 mm. long: peduncles glabrous, 2.5–4 cm. long; bracts and the small bractlets glandular-ciliate; corolla dark purple, about 1.2 cm. long, glabrous outside or sparingly hairy, with very short, scarcely gibbous but abruptly widened tube; stamens about as long as limb, filaments pubescent at base, longer than anthers: fr. red. W. China. Intr. 1910. Zone V.—Very distinct on account of its often lobed lvs. and dark fls.

Related species are: **L. heterôloba** Batal. Similar to No. 31, but lvs. smaller, more pilose, densely so on midrib: stamens shorter than limb; filaments glabrous, shorter than anthers. N. W. China. Intr. 1911. Zone V.—**L. mupinénsis** Rehd. Shrub to 3 m.; brts. glandular or glabrous; winter-buds with lanceolate, acuminate upright scales persisting at base of brts.: lvs. oblong-obovate to oblong-lanceolate, 6–12 cm. long, abruptly acuminate, pilose on veins beneath or sometimes nearly glabrous; petiole glandular: peduncles to 6 cm. long; corolla dark purple, glabrous. W. China. Intr. 1908. Zone V.

32. **L. conjugiàlis** Kell. Upright much-branched shrub to 1.5 m.; brts. glabrous or sparingly pubescent: lvs. short-petioled, elliptic or ovate to obovate, 2.5–5 cm. long, acute or short-acuminate, cuneate, ciliate, pubescent or nearly glabrous beneath; peduncles 1.5–2.5 cm. long; bracts small, deciduous; bractlets minute or obsolete; corolla dark red, about 1 cm. long, glabrous outside; tube gibbous, shorter than limb; stamens about as long as limb, pubescent below the middle; style pubescent to apex; ovaries connate: fr. subglobose, 8 mm. across, red. Fl.VI; fr.VIII. S.H.2:f.450g,451k-m. Wash. to Calif. and Nev. Intr. 1896. Zone (V).

33. **L. Maximowíczii** Reg. Shrub to 3 m.; brts. glabrous, purplish: lvs. elliptic or ovate to ovate-oblong, 3–7 cm. long, acute to acuminate, usually rounded at base, dark green and glabrous above, lighter green and pubescent beneath: peduncles 1.5–2.5 cm. long, glabrous; bracts subulate, about ⅓ as long as ovaries; bractlets shorter, roundish, ciliate; corolla about 1 cm. long, glabrous outside, violet-red; limb longer than the gibbous tube; stamens slightly longer than limb; style as long as limb; ovaries connate: fr. ovoid, red. Fl.V–VI; fr.VIII. Gt.17:t.597. Manch., Korea. Intr. about 1855. Zone IV.—Var. **sachalinénsis** Fr. Schmidt. Lvs. broader, less acuminate, glabrous or nearly so and glaucescent beneath, red when unfolding; fls. dark purple. N.K.11:t.37. (*L. s.* Nakai.) Saghal., Korea. Intr. 1917.—Very attractive in fruit; flowers of the var. more conspicuous than in the type.

34. **L. Tatarinôvii** Maxim. Upright shrub to 1.5 m.; brts. glabrous: lvs. oblong-lanceolate, 3–7 cm. long, acuminate, glabrous above, grayish or whit-

ish tomentulose beneath; petiole 2–5 mm. long: peduncle 1–2 cm. long; bracts and bractlets ⅓ to ½ as long as the connate ovaries; corolla about 8 mm. long, dark purple, glabrous outside; tube gibbous, shorter than limb; stamens and the pubescent style shorter than limb: fr. subglobose, red. Fl.v–vi; fr.vii–ix. N.K.11:t.35. N. China, Korea. Intr. 1913. Zone V.—Var. **leptántha** Nakai is scarcely different.

35. **L. Chamíssoi** Bge. Upright shrub to 1 m.; brts. glabrous: lvs. subsessile, ovate to elliptic, 2.5–5 cm. long, obtuse, rarely acute, rounded at base, glabrous, conspicuously veined: peduncles slender, subterminal, 6–14 mm. long; bracts and bractlets about ¼ as long as ovaries, glabrous; calyx-teeth triangular; corolla 1.2 cm. long, dark violet, glabrous outside, with short gibbous tube; stamens and style shorter than limb, glabrous; berries connate, red. Fl.v–vi; fr.viii. Bull. Soc. Nat. Moscou,37,1:t.2,f.1,2. S.H.2:f.450m, 452c-e. N. E. Asia, Japan. Cult. 1909. Zone V or IV.

36. **L. subséssilis** Rehd. Shrub to 2 m., glabrous; brts. purplish; lvs. ovate or elliptic-ovate, 3–5.5 cm. long, acute or short-acuminate, broad-cuneate, the lower ones sometimes obtusish and rounded at base, bright green above, pale beneath, distinctly veined; petiole 2–5 mm. long; fls. slightly fragrant, subsessile or on stalks shorter than the petioles, bracts shorter than bractlets, the latter connate into a cupula ⅓ as long as the wholly or partly connate ovaries; corolla white to yellowish, 1.2 cm. long, upper lip 3-lobed, much longer than the gibbous tube; stamens 4, as long as limb; style slightly longer: fr. bright red, 6–8 mm. long. Fl.vi; fr.viii–ix. N.K.11:t.34. (*L. diamantiaca* Nakai.) Korea. Intr. 1917. Zone V.—Differing from all related species in its 4-merous fls.

37. **L. orientàlis** Lam. Shrub to 3 m.; brts. glabrous: lvs. ovate to ovate-lanceolate, rarely elliptic, 4–10 cm. long, usually acuminate, rounded to broad-cuneate, pubescent and light green beneath; petiole 6–10 mm. long: peduncles shorter or as long as petioles (in some vars. longer); bracts subulate, not exceeding the ovaries; bractlets connate into small distinct pairs; calyx-teeth lanceolate; corolla about 1.2 cm. long, dull pink to violet, glabrous outside, tube gibbous, much shorter than limb; stamens and style shorter than limb; ovaries connate: fr. black. Jaubert & Spach, Ill. Pl. Or.1:t.71. Asia Minor. Not intr.—Var. **caucásica** Zab. Lvs. elliptic to elliptic-oblong, 3–7 cm. long. 1.5–5 cm. broad, broad-cuneate at base, glaucescent and glabrous beneath: corolla-tube less gibbous. Fl.v–vi; fr.viii–ix. Gt.11:t.359. Transcauc., Armenia. Intr. about 1825. Zone V.—Var. **longifòlia** Dipp. Lvs. oblong to lanceolate, 2.5–6 cm. long, about 1–2 cm. broad: fls. smaller, reddish, with slightly or scarcely gibbous tube. Gt.40:124. (*L. Kesselringii* Reg., *L. kamtchatica* and *L. savranica* Hort.) Intr. 1888, supposedly from Kamtchatka.—Of little ornamental value.

A closely related species is **L. díscolor** Lindl. Shrub to 2 m., glabrous: lvs. elliptic to elliptic-oblong, glaucous beneath: fls. yellowish white, often tinged red, on slender stalks 1.5–3 cm. long. B.R.33:t.44(c). (*L. orientalis* var. *d.* Clarke.) Kashmir to Afghan. Cult. 1847. Zone (V).

38. **L. nervòsa** Maxim. Shrub to 3 m., with upright and spreading slender brs., glabrous: lvs. red when unfolding, elliptic to ovate-oblong, 2.5–6 cm. long, acute at ends, bright green, usually with red midrib and reddish veins, bluish green beneath; petiole 3–5 mm. long; peduncles about 1 cm. long; bracts subulate, scarcely as long as ovaries: bractlets connate into a lobed cupula half as long as ovaries, sometimes in distinct pairs, ovate-lanceolate, glandular-ciliate or glabrous: corolla about 1 cm. long, light pink; limb somewhat longer than the gibbous tube; stamens about as long as

limb; style shorter, pubescent to near the apex; berries distinct, black. Fl.v–vi; fr.viii–ix. S.H.2:f.452m-o,453l. N. W. China. Intr. about 1890. Zone V.—Graceful shrub with handsome foliage.

A related species is **L. lanceolàta** Wall. Shrub to 4 m.; brts. glandular-puberulous: lvs. ovate to ovate-lanceolate, 4–10 cm. long, acuminate, pubescent beneath on the veins and sparingly glandular on both sides: peduncles 1–1.5 cm. long; cupula as long or somewhat shorter than ovaries, glandular-ciliate; corolla pale violet, strongly gibbous at base. S.H.2:f.452p-r,453c-d. (*L. decipiens* Hook. f. & Thoms.) Himal. and W. China. Intr. about 1904 from China. Zone (V).

39. **L. nígra** L. Shrub to 1.5 m.; brts. glabrous: lvs. elliptic to ovate-lanceolate, 4–6 cm. long, acute or obtusish, broad-cuneate or rounded at base, bright green and glabrous above, light bluish green beneath and villous along the midrib, finally often glabrous; petiole 2–5 mm. long: peduncles 3–4 cm. long, glabrous; bractlets connate into a glandular-ciliate cupula, like the bracts about ½ as long as ovaries: berries nearly distinct, bluish black. Fl. v–vi; fr.viii–ix. R.I.17:t.123,f.3(c). F.D.28:2918(c). Eu., Korea. Cult. 1683. Zone V.

The supposed hybrid with *L. orientalis* is probably a form of × *L. xylosteoides* and that with *L. Xylosteum* a form of the latter species.

Sect. 3. Coeloxylosteum Rehd. Brs. with quickly evanescent pith, fistulose: ovaries always distinct, 3-celled; bractlets distinct or connate into pairs above the bracts; corolla always 2-lipped; fr. red, yellow or white.

40. **L. tatarica** L. Tatarian H. Upright shrub to 3 m., glabrous; older brs. gray: lvs. ovate to ovate-lanceolate, 3–6 cm. long, acute to acuminate, rarely obtusish, dark green above, light to bluish green beneath; petiole 2–6 mm. long: peduncles slender, 1.5–2 cm. long; bracts usually linear-lanceolate, not or slightly longer than calyx; bractlets distinct, roundish to broad-oblong, ⅛–½ as long as ovaries; corolla pink to white, 1.5–2 cm. long; tube slightly gibbous at base, shorter than limb, lateral lobes of upper lip divided to the base, spreading; stamens and style shorter than limb: berries globose, red. Fl.v–vi; fr.vii–viii. B.M.8677(c). B.R.31(c). G.O.t.87(c). S. Russia to Altai and Turkest.; occasionally escaped from cult. Cult. 1752. Zone V. —Very variable and many forms are cult. in gardens.—Var. **latifòlia** Loud. Lvs. large, to 10 cm. long and to 5 cm. broad: fls. large, pink. Gt.18:t.627,f.1 (c). (*L. t.* var. *splendens* Reg.)—Var. **sibìrica** Pers. Lvs. smaller: fls. deep pink. B.M.2469(c). F.D.17:t.123,f.4–5(c).—Var. **rósea** Reg. Fls. rosy-pink outside, light pink inside. Gt. 18:t.627,f.4(c).—Var. **alba** Loisel. Fls. pure white, of medium size. (Var. *albiflora* DC.)—Var. **grandiflòra** Rehd. Fls. pure white, large: lvs. large.—Var. **angustifòlia** Kirchn. Lvs. narrow, ovate-lanceolate, 4–6 cm. long and 1–2 cm. wide: fls. light pink.—Var. **lùtea** Loud. Fr. yellow. (Var. *xanthocarpa* Endl.)—Var. **Leroyàna** Rehd. Low compact shrub: lvs. oblong-lanceolate, to 7 cm. long, rounded at base, ciliolate: fls. sparingly produced, pink. G.W.19:203(h).—Var. **nàna** Alphand. Dwarf shrub: lvs. oblong-ovate, 2–5 cm. long, broad-cuneate: fls. small, pinkish, numerous; bracts usually leafy.—Var. **parvifòlia** Jaeg. Lvs. ovate-elliptic to ovate-oblong, 2–5 cm. long, obtusish, often bluish green: fls. small, white, upper lip with broad and short lobes: fr. orange-red. (*L. p.* Hayne.) Turkest. —Var. **pállens** Rehd. Lvs. small and narrow, pale bluish green: fls. pinkish, finally nearly white. Turkest.—Popular ornamental shrub, much planted for the profusely produced fls. and the attractive red frs.

L. t. × *Korolkowii* = **L. amoèna** Zab. Very floriferous shrub with small ovate lvs. and slender-stalked fls.; bractlets connate into pairs. Orig. before 1895.—Var. **rósea** Zab. with rose-colored fls.—Var. **alba** Zab. with white fls.—Var. **arnoldiàna** Rehd. Lvs. oblong-lanceolate, 2–3.5 cm. long: fls. white, flushed pink; very floriferous and graceful. Orig. 1899.—*L. t.* × *Xylosteum* = **L. xylosteoìdes** Tausch.

Lvs. usually rhombic-ovate, broad-cuneate at base, bluish green, slightly pubescent: fls. small, pinkish. D.H.1:233. (*L. nepalensis* Kirchn., *L. coerulescens* Dipp., *L. micrantha* Zab., not Reg.) Orig. before 1838.—*L. micranthoides* Zab. supposed to be a hybrid of *L. tatarica* and *L. nigra* probably belongs here: lvs. glabrate, elliptic to elliptic-obovate: fls. small and usually malformed.—*L. x.* × *Ruprechtiana* = *L. salicifolia;* see under No. 46.—*L. t.* × *Morrowii* = *L. bella;* see under No. 45.—*L. t.* × *Ruprechtiana* = *L. notha;* see under No. 46.

41. **L. Korolkòwii** Stapf. Shrub to 4 m., with spreading brs.; young brts. finely pubescent: lvs. ovate to elliptic, 1–2.5 cm. long, usually acute, cuneate to rounded at base, slightly pubescent above, more densely so beneath, rarely glabrate, bluish green; petiole 3–6 mm. long; peduncles 1–2.5 cm. long, puberulous; bracts about as long and bractlets about ⅓ as long as ovaries, connate into pairs, ciliate or glabrous; corolla rose-colored, rarely white, about 1.5 cm. long; lateral lobes of upper lip divided to the middle or slightly beyond, tube slightly gibbous; stamens and style shorter than limb: fr. bright red. Fl.v–vi; fr.viii. G.F.7:35. (*L. floribunda* var. *K.* Zab.) Turkest. Cult. 1880. Zone V.—Var. **auròra** Koehne. Lvs. ovate to elliptic: corolla to 1.8 cm. long, with slender tube, rosy pink; bractlets ½ as long as ovaries. M.D. 1910:117,f.c.—Var. **floribúnda** Nichols. Lvs. broad-ovate, usually rounded or sometimes subcordate at base. Gt.42:103,f.4–6. (*L. f.* Zab., not Boiss. & Buhse.)—Var. **Zabèlii** Rehd. Lvs. usually broad-ovate, rounded to subcordate at base, glabrous. Gt.42:103,f.1–3. (*L. Z.* Rehd.)

L. K. × *tatarica* = *L. amoena;* see under No. 40.

42. **L. Xylósteum** L. European Fly-H. Shrub to 3 m.; brts. glabrous or pubescent: lvs. broad-ovate or elliptic-ovate to obovate, 3–6 cm. long, acute, broad-cuneate to rounded at base, dark or grayish green and sparingly pubescent or glabrous above, paler and pubescent, rarely glabrate beneath; petiole 3–8 mm. long: peduncles 1–2 cm. long, pubescent; bracts subulate, not exceeding the ovaries; bractlets broad, about half as long as ovaries, pubescent and glandular; ovaries glandular; corolla about 1 cm. long, whitish or yellowish white, often tinged reddish, pubescent outside; tube short, gibbous; stamens nearly as long as limb, style shorter; filaments pubescent at base: fr. dark red. Fl.v–vi; fr.viii–ix. R.I.17:t.123,f.1–2(c). F.D.28:t. 2917(c). B.B.3:282. Eu. to Altai; sometimes escaped. Long cult. Zone IV. —Var. **móllis** Reg. Lvs. densely pubescent on both sides.—Var. **glabréscens** Zab. Lvs. elliptic-oblong, glabrous or nearly so above; peduncles about as long as the yellowish white corolla.—Var. **lûtea** Loisel. Fr. yellow: lvs. pubescent. (Var. *xanthocarpa* DC.) —The fls. are rather insignificant, but the frs. are attractive.—*L. segreziensis* Lav. supposed to be a hybrid with *L. quinquelocularis* is probably only a form of *L. Xylosteum.*

L. X. × *chrysantha* = **L. pseudochrysántha** A. Br. Similar to *L. chrysantha,* but bractlets broad and about half as long as ovaries and ciliate. (*L. Regeliana* Dipp., in part, not Kirchn.)—*L. X.* × *tatarica* = *L. xylosteoides;* see under No. 40.

43. **L. chrysántha** Turcz. Upright shrub to 4 m.; young brts. pilose, rarely nearly glabrous: lvs. rhombic-ovate to rhombic-lanceolate or ovate-lanceolate, 6–12 cm. long, acuminate, rounded to broad-cuneate at base, dark green and nearly glabrous above, lighter green and pilose at least on the veins beneath; petiole 3–5 mm. long: peduncles pilose, 1.5–2.5 cm. long; bracts as long or longer than ovaries; bractlets ovate-oblong to suborbicular, ⅓–½ as long as ovaries, glandular and sparingly long-ciliate; corolla yellowish white, changing to yellow, 1.5–2 cm. long, sparingly pubescent outside, upper lip divided about ½; tube strongly gibbous, short; stamens about as long as limb, pubescent below the middle; ovaries usually oblong-ovoid, glandular; berries coral-red. Fl.v–vi; fr.viii–ix. Gt.12:t.404(c). N.T.1:464. N. E.

Asia to C. Japan. Intr. about 1854. Zone IV.—Var. **Regeliàna** Zab. Differs in the smaller more yellowish fls.—Var **latifòlia** Korsh. Lvs. broad-elliptic to ovate-elliptic, usually rounded at base, only sparingly pilose beneath, somewhat thickish. (Var. *turkestanica* Rehd.)—Var. **villòsa** Rehd. Lvs. elliptic to elliptic-ovate, sparingly pubescent above, villous beneath, chiefly on the veins.

L. c. × *Xylosteum* = *L. pseudochrysantha;* see under No. 42.

A related species is **L. Koehneàna** Rehd. Lvs. densely soft-pubescent beneath and grayish green; bractlets connate into pairs, about half as long as ovaries, upper lip of corolla divided about ¼; ovaries subglobose, glandular and pilose; anthers with pilose connective: fr. dark red. S.T.1:t.21. W. China. Intr. about 1904. Zone V.

44. **L. demíssa** Rehd. Much-branched shrub to 4 m., with spreading brs.; brts. short-villous; winter-buds small, ovoid: lvs. obovate or elliptic-obovate, or on vigorous shoots elliptic, 1.5–3 cm. long, acute or obtusish and mucronulate, broad-cuneate, dull-green and appressed-pilose above, more densely so and pale green beneath; petiole 1–2 mm. long; peduncle 6–12 mm. long, pilose; bracts twice as long, bractlets half or nearly as long as ovaries, ciliate and sparingly pilose; corolla whitish changing to yellowish, about 1 cm. long; upper lip with short oval lobes; stamens slightly longer than limb: berries globose, 6–9 mm. across, scarlet. Fl.v–vi; fr.ix. (*L. ibotaeformis* Nakai.) Japan. Intr. 1914. Zone V.—Dense small-leaved shrub, handsome in autumn in fr.

45. **L. Morròwii** A. Gray. Shrub to 2 m., with wide-spreading brs.; young brts. soft-pubescent: lvs. elliptic to ovate-oblong or obovate-oblong, 3–5 cm. long, acute or obtusish and mucronulate, rounded at base, sparingly pubescent above at least when young, soft-pubescent beneath; petiole 2–3 mm. long: peduncles 5–15 mm. long, pubescent; bracts pubescent, usually exceeding the calyx; bractlets about as long as ovaries, pubescent; corolla white, changing to yellow, 1.5 cm. long, pubescent outside; upper lip divided to base into spreading oblong lobes; tube rather slender, gibbous; stamens shorter than limb, glabrous: fr. dark red, rarely yellow. Fl.v–vi; fr.vii–viii. S.I.2:t.73(c). J.L.35:362(h). Gng.5:329(h). Japan; naturalized occasionally in the E. States. Intr. about 1875.—Var. **xanthocárpa** Nash. Fr. yellow.—Distinct shrub of wide-spreading habit, handsome in bloom and in fr.

L. M. × *Ruprechtiana* = **L. muscaviénsis** Rehd. Differs from No. 45 in the acuminate lvs. and from No. 46 in the longer pubescent bracts and bractlets. Gt.42:101,f.1–3. Orig. before 1888.—*L. M.* × *tatarica* = **L. bélla** Zab. Lvs. glabrescent, more acute: fls. pink or pinkish, fading to yellowish. Orig. before 1878.—*L. bella* × *Ruprechtiana* = **L. muendeniénsis** Rehd. Similar to *L. bella*, but lvs. more acuminate and darker green. Gt.42:101,f.4–6. Orig. before 1883. —*L. M.* × *xylosteoides* = **L. minutiflòra** Zab. Lvs. oblong, rather small, nearly glabrous: fls. small. Orig. 1878.

46. **L. Ruprechtiàna** Reg. Shrub to 3 m., with upright and spreading brs.; young brts. slightly pubescent: lvs. oblong-obovate to lanceolate, 6–10 cm. long, acuminate, cuneate, dark green above and glabrous or nearly so, paler beneath and pubescent; petiole about 5 mm. long, pubescent; peduncle 1–2 cm. long, slightly pubescent; bracts subulate, pubescent, usually exceeding the calyx; bractlets usually ovate, ¼–⅓ as long as the glabrous ovaries, glabrous or glandular-ciliate; corolla 1.5–1.8 cm. long, white, changing to yellow, glabrous outside; tube thick, strongly gibbous; upper lip divided about ½; stamens about ⅔ as long as limb: fr. coral- or orange-red. Fl.v–vi; fr.viii–ix. Gt.19:t.645. Manch. to N. China. Intr. about 1860. Zone V.—Var. **xanthocárpa** Zab. Fls. smaller, yellowish: fr. yellow.—Var. **calvéscens** Rehd. Lvs. almost glabrous, only sparingly hairy on the veins beneath: fr. dark dull red. Cult. 1910.—Handsome in bloom and in fr.

L. R. × *tatarica* = **L. notha** Zab. Lvs. usually ovate-oblong, acuminate, glabrate: fls. more or less pinkish, fading to yellowish. Orig. 1878.—*L. R.* × *xylosteoides* = **L. salicifòlia** Zab. Lvs. narrow, acuminate: fls. small similar to a small-flowered form of *L. xylosteoides*. (*L. Ruprechtiana* var. *s.* Dieck, *L. R.* × *micranthoides* Zab.) Orig. before 1880.—*L. R.* × *Morrowii* = *R. muscaviensis;* see under No. 45.—*L. R.* × *bella* = *L. muendeniensis;* see under No. 45.

47. **L. Maàckii** Maxim. Shrub to 5 m.; brts. short-pubescent; winter-buds small, ovoid: lvs. ovate-elliptic to ovate-lanceolate, 5–8 cm. long, acuminate, broad-cuneate, rarely rounded at base, dark green above, lighter beneath, usually pubescent only on the veins on both sides; petiole 3–5 mm., glandular-pubescent; peduncles shorter than petiole, glandular-pubescent; bracts linear, longer than ovaries; bractlets connate into pairs, ½ or as long as ovaries; calyx-limb campanulate, divided to the middle into ovate to lanceolate teeth: corolla to 2 cm. long, white, changing to yellowish, usually glabrous outside, fragrant; tube thin, not gibbous, about ⅓ as long as limb; stamens and style ½–⅔ as long as limb: fr. dark red. Fl.VI; fr.IX–X. Gt.33:t.1162(c). G.C. III.62:252. R.H.1920:122(h),124. U.S.Im.74:t(h). Manch., Korea. Intr. about 1855 or 1860. Zone IV.—Var. **podocárpa** Franch. Habit more spreading: lvs. usually elliptic-ovate or elliptic, abruptly acuminate, more pubescent and darker green: fls. slightly smaller, pubescent outside; ovaries raised above the bracts on a very short, but distinct stalk; stamens sometimes as long as limb. Gn.81:549(fr.). Gn.M.33:40(h). W. and C. China. Intr. 1900. Zone V.—Var. **erubéscens** Rehd. A form of the preceding var. with larger fls. flushed pink.—Valued for its conspicuous fragrant white fls. and the attractive late fr.; the var. retains its dark green lvs. until November together with the conspicuous red frs.

48. **L. deflexícalyx** Batal. Upright shrub to 3 m., with spreading or arching brs.; brts. finely pubescent: lvs. oblong-lanceolate to lanceolate, 4–8 cm long, acuminate, broad-cuneate or rounded at base, bright green and sparingly pubescent above, light grayish green and pubescent on the veins beneath; petiole 3–5 mm. long: peduncles usually slightly longer than petioles, pubescent or nearly glabrous; bracts subulate, scarcely longer than calyx; bractlets about ¾ as long as ovaries, glabrous; calyx campanulate 2–3 mm. long, shallowly or indistinctly toothed, scarious and usually splitting to the base on 1 or 2 places; corolla yellowish, later yellow, 1.5 cm. long, appressed-pubescent outside; tube short, strongly gibbous; lobes of upper lip short: fr. brick-red. Fl.VI; fr.VII–VIII. B.M.8536(c). B.S.2:42. W. China, Tibet. Intr. 1904. Zone V.—Var. **xerócalyx** Rehd. Lvs. lanceolate to narrow-lanceolate, 6–10 cm. long, rounded or truncate at base, glaucescent beneath; bractlets connate into a truncate or 2-lobed cupula, longer than ovaries; calyx about 4 mm. long. (*L. x.* Diels.) S. W. China. Cult. 1915. Zone (V). —Floriferous shrub of distinct appearance.

L. d. × *quinquelocularis* = *L. Vilmorinii;* see under No. 50.

49. **L. trichosántha** Bur. & Franch. Spreading shrub to 1.5 m., with slender sometimes sarmentose brs.; brts. glabrous or slightly pubescent: lvs. ovate to obovate, 2.5–5 cm. long, obtuse and usually mucronulate, rounded or truncate at base, bright green, pilose beneath at least on the veins and reticulate: peduncles shorter than petioles: fls. like those of No. 48: fr. bright red. Fl.VI; fr.VIII. S.H.2:f.456r-s,457a-b. (*L. ovalis* Batal.) W. China, Tibet. Intr. 1904.—Var. **glabràta** Rehd. Lvs. generally broad-oval or -ovate, rounded and usually without mucro at apex, sometimes subcordate at base, glabrous beneath and not reticulate.—Var. **acutiuscula** Rehd. Lvs. usually elliptic or elliptic-ovate, acute or acutish, rounded to broad-cuneate at base,

usually 2–2.5 cm. long on flowering brts., slightly pilose at least on veins beneath.

A closely related species is **L. prostràta** Rehd. Prostrate shrub forming dense mats or sometimes a low depressed shrub with sarmentose brs.: lvs. ovate or elliptic, 1–2 cm. long, acute or acutish: fls. smaller. W. China. Intr. 1904.

50. **L. quinqueloculàris** Hardw. Upright shrub with spreading brs.; brts. short-pubescent: lvs. broad-ovate to elliptic or oblong-ovate, 3–7 cm. long, acute or short-acuminate, broad-cuneate to rounded at base; slightly pubescent above, more densely and grayish green beneath; petiole 3–5 mm. long; peduncles very short; bracts subulate, not exceeding the calyx; bractlets ⅔ to nearly as long as ovaries; calyx-limb cup-shaped with broad short teeth; corolla 1.5–2 cm. long, yellowish, densely appressed-pubescent outside; tube slender, slightly or scarcely gibbous, usually only slightly shorter than limb; stamens and style about as long as limb: berries whitish, translucent, with blackish violet seeds. Fl.VI; fr.IX–X. B.R.30:33(c). H.I.9:807. Gt.55:t.1551, f.1(c, fr.). (*L. diversifolia* Wall., *L. Royleana* Wall.) Himal. to Afghan. and Beluch. Cult. 1840. Zone (V).—Var. **translùcens** Zab. Lvs. ovate to ovate-oblong, usually subcordate to rounded at base; corolla smaller; tube rather short, stouter and distinctly gibbous. (*L. t.* Carr.) Cult. 1870.

L. q. × *deflexicalyx* = **L. Vilmorînii** Rehd. Similar to No. 48: lvs. smaller, broader and less acuminate; calyx distinctly 5-toothed; peduncles shorter: fr. yellowish pink, minutely dotted red. Orig. about 1900. Zone (V).

Another species with white fr. is **L. arbórea** Boiss. Shrub to 3 m.: lvs. broad-ovate to ovate-oblong, 2–4 cm. long, obtuse or acutish, pubescent beneath; peduncles short; bractlets about ⅓ as long as ovaries; calyx with ovate to ovate-lanceolate teeth: corolla reddish white; tube gibbous, half as long as limb. S.H.2:f. 453o-p,458d-f. Spain, N. Afr. Cult. 1900. Zone VI?—Var. **pérsica** Rehd. Lvs. smaller, often acute, less pubescent to nearly glabrous: corolla-tube not gibbous, longer than half the limb. S.F.3:t.223(c). Jaubert & Spach, Ill. Pl. Or.t.69,70. (*L. p.* and *L. nummulariifolia* Jaub. & Spach, *L. turcomanica* Fisch. & Mey.) S. E. Eu. to Afghan. and Turkest. Cult. 1880. Zone V.—Apparently without ornamental merit.

Sect. 3. Nintooa DC. Twining shrubs with usually hollow brs. and with usually evergreen or half-evergreen lvs.: fls. in axillary pairs often forming terminal spikes or panicles: bracts usually subulate; bractlets and ovaries distinct (except in 1 species); calyx distinctly toothed; corolla 2-lipped, with slender tube: fr. black, rarely white or yellow.

51. **L. Hénryi** Hemsl. Half-evergreen twining or prostrate shrub; brts. densely strigose: lvs. oblong-lanceolate to lanceolate, 4–8 cm. long, acute to acuminate, rounded to subcordate at base, ciliate, usually pubescent on midrib beneath: fls. on pubescent or glabrous stalks 2–10 mm. long, often forming short spikes at the end of brts.; calyx-teeth triangular-ovate, ciliate or glabrous; corolla 1.5–2 cm. long, yellowish red to purple-red; tube slightly ventricose, usually slightly longer than limb: fr. black. Fl.VI–VIII; fr.IX–X. B.M.8375(c). W. China. Intr. 1908. Zone V.—Var. **subcoriàcea** Rehd. Lvs. ovate-oblong, 5–10 cm. long, not ciliate, subcoriaceous; corolla slightly longer, with longer tube. Intr. 1910.

A related species is **L. alseuosmoïdes** Graebn. Brts. glabrous: lvs. lanceolate to narrow-lanceolate, 3–6 cm. long, 8–15 mm. broad: corolla 1.5 cm. long; tube longer than limb. S.H.2:f.457h,458m-o. W. China. Intr. 1908.

52. **L. Giráldii** Rehd. Twining shrub; brts. like petioles and peduncles densely clothed with spreading yellowish hairs: lvs. oblong-lanceolate to lanceolate, 3.5–8 cm. long, acuminate, truncate or subcordate at base, pilose on both sides; petiole 2–4 mm. long: fls. on short stalks crowded at end of brts.; bracts longer than calyx, like bractlets and calyx-teeth pilose; corolla purplish red, about 2 cm. long, yellowish hairy outside; tube slightly ventricose, longer than limb; stamens and style slightly exceeding the limb: fr.

purple-black. Fl.VI–VIII. B.M.8236(c). Rep. Mo. Bot. Gard.14:t.3,f.14–16. S.L.254(h). N. W. China. Intr. 1899. Zone V.—Very distinct and striking on account of the yellowish pubescence of the red fls.

53. **L. símilis** Hemsl. Half-evergreen climbing shrub; brts., petioles and peduncles hirsute: lvs. oblong-lanceolate to lanceolate, 4–9 cm. long, acuminate, truncate to subcordate at base, ciliate, bright green and glabrous above, whitish tomentose and hirsute beneath; petiole about 5 mm. long: fls. racemose at end of brs.; lower peduncles to 4 cm. long, decrescent toward the apex; corolla white, changing to pale yellow, 4–6 cm. long, hirsute and glandular outside; tube slender, longer than limb; stamens and style exceeding the limb: fr. black. Fl.VIII. S.H.2:f.457o-p,458i-k. C. and W. China. Only the following var. in cult.—Var. **Delavaÿi** Rehd. Glabrous or nearly so in all parts except the white-tomentose under side of the slightly ciliate lvs. B.M. 8800(c). M.O.267. (*L. D.* Franch.) W. China. Intr. 1901. Zone VII?

54. **L. confûsa** DC. Half-evergreen twining shrub; brts. pubescent: lvs. ovate to ovate-oblong, 3–6 cm. long, acute, usually rounded at base, dark green above and finally glabrous, short-pubescent and grayish green beneath; petiole about 5 mm. long: fls. short-stalked in short and dense panicles at end of brts.; bracts, bractlets and ovaries pubescent; corolla about 4 cm. long, white, changing to yellow, very fragrant, pubescent and glandular outside; tube slender, slightly longer than limb; stamens and style longer than limb: fr. black. Fl.VI–IX. B.R.70(c). L.D.t.132(c). (*L. japonica* Andr., not Thunb.) E. China. Intr. 1805. Zone VIII?—Planted chiefly for its very fragrant fls.

A closely related species is **L. biflòra** Desf., readily distinguished by the glabrous ovaries. Desfontaines, Fl. Atl.t.52. S. W. Eu., N. Afr. Cult. 1889. Zone VIII?

55. **L. japónica** Thunb. Half-evergreen twining shrub; brts. pubescent: lvs. ovate to oblong-ovate, 3–8 cm. long, acute to short-acuminate, rounded to subcordate at base, pubescent on both sides when young, later glabrate above; petiole about 5 mm. long: peduncle usually solitary, axillary, longer, rarely shorter than petioles; bracts leafy, broad-ovate to elliptic; bractlets ⅓–½ as long as ovaries; corolla 3–4 cm. long, pubescent and glandular outside, white, tinged purple, very fragrant; tube about as long as limb; style and stamens longer than limb: fr. black. Fl.VI–IX; fr.IX–X. N.T.1:458. E. Asia, often naturalized in the E. States. Intr. 1806. Zone V.—Var. **Halliàna** Nichols. Similar to the type, but fls. pure white at first, changing to yellow; upper lip divided nearly to the middle into oblong lobes. Gng.3:293. M.G. 16:609(h).—Var. **chinénsis** Baker. Lvs. nearly glabrous, but usually ciliate and often slightly pubescent on the veins beneath, usually tinged more or less red purple when young; corolla carmine outside, upper lip divided more than ½. B.R.712(c). B.M.3316(c). (*L. c.* Wats., *L. flexuosa* Ker, not Thunb.) Cult. 1825.—Var. **rèpens** Rehd. Lvs. ovate to oblong-ovate or elliptic-oblong, acute or obtusish, rounded to broad-cuneate at base, nearly glabrous, veins often purplish; corolla white or tinged pale purple; limb longer than tube; upper lip divided about ⅓; bractlet rounded or truncate, often as long as ovaries. Jaarb. Maatsch. Anmoed. Tuinb.1845:t.7(c). Baker, Ref. Bot.4:t. 224(c, as var. *chinensis*). (Var. *flexuosa* Nichols., *L. flexuosa* Thunb., *L. brachypoda* DC.) Intr. 1843.—A form with usually smaller lvs. netted with yellow is var. **aureo-reticulàta** Nichols. I.H.9:t.337(c). B.H.21:59,t(c). (*L. flexuosa* var. *a.* Dipp., *L. brachypoda reticulata* Witte.) Intr. about 1860.—Valued for its handsome fragrant fls. appearing during the summer; also used as ground-cover.

Subgen. II. PERICLYMENUM L. Twining, rarely dumose shrubs; brs. hollow: lvs. deciduous or persistent, usually one or several pairs below the infl. connate into a disk: fls. at end of brts. in 3-fld. sessile cymes, rarely reduced to 1 or 2 fls., forming whorls in the axils of bracts or connate lvs.; bractlets distinct or sometimes wanting (connate in 1 species), calyx-lobes short, sometimes inconspicuous; corolla 2-lipped or sometimes nearly regular: fr. red.

56. **L. sempérvirens** L. TRUMPET H. High-climbing glabrous shrub: lvs. very short-petioled or subsessile, elliptic or ovate to oblong, 3–8 cm. long, obtuse or acutish, usually cuneate, dark green above, glaucous beneath and sometimes pubescent, 1 or 2 pairs below the infl. connate into a suborbicular to oblong disk, rounded and mucronate at ends: infl. a slender peduncled spike with remote whorls; corolla about 5 cm. long; tube slender, slightly ventricose below the middle, 5 to 6 times as long as the ovate nearly equal upright lobes, orange yellow and scarlet; stamens and style slightly exceeding the limb. Fl.v–viii; fr.ix–x. B.M.781(c). R.H.1856:351,t(c). Gn.45:307. Conn. to Fla., w. to Neb. and Tex.; sometimes escaped from cult. Intr. 1656. Zone V. —Var. **supérba** Reg. Fls. of bright scarlet color. F.S.11:t.1128(c). (*L. s. speciosa* Carr.)—Var. **sulphùrea** Jaques. Fls. yellow. Gt.2:t.38(c). (Var. *flava* Reg.)—Var. **mínor** Ait. Lvs. elliptic to oblong-lanceolate, often half-evergreen; corolla usually 4 cm. long. B.M.1753(c). B.R.556(c). Gn.34: 300,t(c).—Handsome summer-blooming vine, valued for its brightly colored fls.

L. s. × *hirsuta* = **L. Brôwnii** Carr. Similar to No. 56, but corolla more or less 2-lipped and tube slightly gibbous at base: lvs. sometimes sparingly ciliate and slightly pubescent beneath and petiole sparingly glandular. Gt.2:t.38(c). F.S.11: t.1133(c). (*L. sempervirens Brownii* André.) Orig. before 1850. Zone V.—Cult. in several forms: Var. **punícea** Rehd. Fls. orange-red.—Var. **Yoùngii** Rehd. More vigorous: fls. deeper orange-red.—Var. **fuchsioìdes** Rehd. Fls. scarlet outside, distinctly 2-lipped. G.F.9:496. (*L. f.* K. Koch, not Hemsl.)—Var. **plantierénsis** Rehd. Fls. coral-red, lobes orange. I.H.18:t.86(c). (*L. p.* André.)—Also *L. Hendersonii* Hort. belongs here.—*L. s.* × *americana* = *L. Heckrottii;* see under No. 66.

57. **L. ciliòsa** Poir. Twining or procumbent: lvs. short-petioled or subsessile, ovate or elliptic to oblong-elliptic, 5–10 cm. long, obtuse or acutish, broad cuneate, rarely rounded at base, ciliate, bluish green beneath, sometimes pubescent when young; the upper pair connate into an elliptic disk usually acute at ends; petioles to 6 mm. long; fls. in short-stalked heads of one or few whorls; corolla 3–4 cm. long, usually sparingly hairy outside, yellow, sometimes tinged purple, tube ventricose at base, 3–4 times as long as the 2-lipped limb; style pubescent and like the stamens longer than limb. Fl.vi; fr.viii–ix. S.H.2:f.460h,462d-e. B. C. to Calif., Mont. and Utah. Intr. 1825. Zone V.—Var. **occidentàlis** Nichols. More vigorous, with larger more brightly colored fls. glabrous outside. B.R.1457(c). D.H.1:214. (*L. o.* Hook., *L. ciliosa volubilis* Zab.) Intr. 1824.

A closely related species is **L. arizònica** Rehd. Lvs. ovate to oval, 2–4, rarely to 7 cm. long, ciliate; petiole 6–12 mm. long: corolla with nearly regular limb, 3.5–4.5 cm. long, tinged scarlet outside, glabrous. S.T.1:t.23. Ariz., N. Mex. Intr. about 1900.—Another species with subequal fls. is **L. subaequàlis** Rehd. Lvs. elliptic to obovate-oblong, 6–10 cm. long, obtuse, the upper pair connate, elliptic, pointed at ends, bearing the sessile fl.-whorl; corolla funnelform, 2.5–3 cm. long, sparingly glandular outside; stamens about as long as limb, style longer, glabrous. R.Mo.14:t.4,f.5–9. W. China. Intr. 1908. Zone VI?

58. **L. hispídula** Dougl. Bushy shrub with sarmentose brs., rarely twining; brts. usually hirsute and glandular: lvs. ovate to ovate-oblong, 3–6 cm. long, acute or abruptly acuminate, rarely obtuse, rounded to subcordate at base, ciliate, glabrous to sparingly pilose above, pubescent beneath, the upper pair usually connate into an usually acute disk; the pair below often with foliaceous

stipules; petiole to 8 mm. long: fl.-whorls usually several, approximate, forming long-peduncled spikes; bractlets ½ as long as ovaries; corolla 2-lipped, about 1.5 cm. long, pilose or glabrous outside, whitish, tinged purple; tube about as long as limb; stamens and style as long as limb. Fl.VI–VII; fr.VIII–IX. B.R.1761(c). D.H.1:211. (*L. h.* var. *Douglasi* Gray.) B. C. to n. Calif. Intr. about 1830. Zone VI or VII.—Var. **vacíllans** Gray. More vigorous; lvs. ovate-oblong, 3–8 cm. long, usually acute, usually glabrous above, glabrous or pubescent beneath: infl. longer, sometimes paniculate; corolla to 1.8 cm. long. (Var. *californica* Rehd.) B. C. to s. Calif. Intr. about 1880.—Less showy than other related species.

59. **L. hirsùta** Eaton. High climbing shrub; brts. usually hirsute: lvs. short-petioled, elliptic, 5–11 cm. long, dark green and often pilose above, grayish green and pubescent beneath, 1 or 2 pairs connate into an elliptic acute disk: fls. in short usually peduncled glandular-pubescent spikes; corolla 2–2.5 cm. long, orange-yellow, glandular-pubescent outside; tube longer than limb, ventricose below the middle; style and stamens exceeding the limb. Fl.VI–VII; fr.IX–X. B.M.3103(c). G.F.9:344. S.L.256(h). (*L. pubescens* Sweet.) Que. to Sask., s. Pa., Ohio, Mich., Neb. Intr. about 1825. Zone IV. —Attractive vine.

L. h. × *sempervirens* = *L. Brownii;* see under No. 56.—*L. h.* × *prolifera* = *L. Sargentii;* see under No. 62.—Hybrids of *L. h.* with *L. dioeca* and *L. flava* have been recorded.

60. **L. dioèca** L. Slightly twining or bushy shrub with sarmentose brs.; glabrous: lvs. very short-petioled or subsessile, elliptic to oblong, 4–8 cm. long, obtuse or acutish, cuneate, with cartilagineous transparent often wavy margin, glaucous beneath, the upper pair connate: fls. in sessile or short-stalked spikes of usually several whorls; corolla about 1.5 cm. long, greenish or whitish yellow, often tinged purplish, glabrous outside; stamens as long as limb, style longer, usually glabrous. Fl.V–VI; fr.VII–IX. B.R.138(c). S.O.2:t.109(c). (*L. glauca* Hill, *L. media* Murr., *L. parviflora* Lam.) Que. to Sask., s. to N. C., Ohio and Iowa. Intr. 1776. Zone II.—Of little ornamental value.

Hybrids of *L. d.* with *L. hirsuta*, *L. prolifera* and *L. flava* have been recorded.

A closely related species is **L. glaucéscens** Rydb. Lvs. pubescent beneath; corolla about 2 cm. long, often pubescent outside; tube slightly longer than limb; style usually pubescent; ovary sometimes glandular. (*L. hirsuta glaucescens* Rydb., *L. Douglasii* Koehne, not DC.) B.B.3:279. S.H.2:f.460n-o,463a-c. Que. to Alb., s. to Va., Ohio and Neb. Cult. 1890? Zone IV or III.

61. **L. yunnanénsis** Franch. Twining shrub; brts. glabrous: lvs. very short-stalked, oblong to oblong-obovate or oblong-lanceolate, 4–8 cm. long, acutish, glabrous above, glaucous and glabrous or slightly pubescent beneath, the upper pair or 2 pairs connate: fls. in a short-peduncled head of one to several whorls; corolla 2–2.5 cm. long, yellow, glabrous; tube slightly ventricose, longer than limb, pubescent inside. S. W. China. Intr. ?—Var. **ténuis** Rehd. Smaller and slenderer: lvs. oblong, about 3 cm. long, sparingly pilose beneath on veins: infl. of 1 whorl; corolla scarcely 2 cm. long, white, changing to yellow. M.O.270. S. W. China. Intr. about 1900. Zone VII?

A related species is **L. albiflòra** Torr. & Gray. Bushy or somewhat climbing shrub: lvs. elliptic or ovate, 2–3.5 cm. long, obtuse, glabrous: infl. of 1 or 2 sessile whorls; corolla 2–3 cm. long, with slender tube, yellowish white. Ark. and Tex. Intr. about 1850. Zone V.—Var. **dumòsa** Rehd. with the lvs. pubescent beneath and corolla pubescent outside, from Ariz., N. Mex. and Mex. is apparently not in cult.

62. **L. prolífera** Rehd. Twining or almost bushy shrub; brts. glabrous: lvs. sessile or very short-petioled, elliptic to oblong-obovate, 5–9 cm. long, obtuse rarely acute, bright green and often bloomy above, glaucous beneath and

usually short-pubescent, usually more than 2 pairs connate into suborbicular or oval flat disks obtuse or emarginate at the ends, thickish and densely bloomy above: fls. in peduncled spikes of 2–4 whorls, often with 2 smaller spikes at base; corolla 2.5–3 cm. long, pale yellow, glabrous outside, with slender tube pubescent inside and slightly ventricose below the middle; style pubescent. Fl. VI–VII; fr. IX–X. R.H. 1856:222, t (c). G.F.3:191. Gn.60: 285. (*L. Sullivantii* Gray, *Caprifolium proliferum* Booth.) Ohio to Tenn., Mo., Iowa and Wis. Cult. 1840. Zone V.

L. p. × *hirsuta* = **L. Sargéntii** Rehd. Lvs. more pubescent beneath and sparingly ciliate; disk slightly or not bloomy above: fls. orange-yellow, usually slightly pubescent outside. G.F.9:345. Orig. 1880.—Also hybrids of *L. p.* with *L. dioeca* and *L. flava* have been recorded.

63. **L. flàva** Sims. Slightly twining, glabrous: lvs. short-petioled, broad-elliptic to elliptic, 4–8 cm. long, obtuse or acutish, bright green above, bluish green beneath, the upper or 2 upper pairs connate into a suborbicular or oval disk rounded and usually mucronulate or acuminulate at ends, green or slightly bloomy above, rather thin: fl.-whorls 1–3 on a short, sometimes to 1.5 cm. long peduncle; corolla about 3 cm. long, orange-yellow, fragrant, with slender not ventricose tube, glabrous or nearly so inside; style glabrous. Fl. V–VI; fr. VIII–IX. B.M.1318(c). L.B.338(c). G.F.3:190. N. C. to Mo., Ark. and Okl. Cult. 1810. Zone V.—One of the handsomest of the American species, with fragrant fls.

64. **L. impléxa** Ait. Evergreen, much-branched twining or sometimes bushy shrub, glabrous: lvs. usually sessile, elliptic or ovate to narrow-oblong, 2.5–8 cm. long, acute to rounded and mucronulate, cuneate to subcordate at base, glaucous beneath, glabrous or pubescent, the upper pairs connate into concave, usually pointed disks; fl.-whorls several, all or the lower ones in the axils of connate lvs.; bractlets wanting; corolla 3.5–4.5 cm. long, yellowish white, often tinged red, glabrous or pubescent outside; tube much longer than the short limb, pubescent inside; stamens and the pubescent style slightly exceeding the tube. Fl. VI–VIII. B.M.640(c). R.I.17:t.122,f.4(c). F.D.28: t.2914(c). Mediterr. Reg. Intr. 1772. Zone VIII?—Very variable.

Hybrids with *L. Caprifolium* and *L. etrusca* are known.

65. **L. Caprifòlium** L. Twining shrub, glabrous: lvs. short-petioled, broad-elliptic to elliptic, 4–10 cm. long, obtuse, dark green above, bluish green beneath, sometimes slightly pubescent when young, the 2 or 3 upper pairs connate into elliptic acutish disks: usually 1 or 2 fl.-whorls in the axils of connate lvs.; bractlets minute or wanting; corolla 4–5 cm. long, white or yellowish white, sometimes slightly purplish, very fragrant, glabrous or sparingly pilose; tube slightly longer than limb; stamens and the glabrous style as long as limb: fr. orange-red. Fl. V–VI; fr. VIII–IX. R.I.17:t.122,f.3(c). F.D.28:2913(c). (*L. pallida* Host.) Eu. and W. Asia. Cult. since centuries; occasionally naturalized in the E. States. Zone V.—Var. **pauciflòra** Carr. Corolla tinged purple outside. R.I.17:t.122,f.1–2(c). (Var. *rubra* Tausch, not West.)

L. C. × *etrusca* = **L. americàna** K. Koch. Lvs. broad-elliptic to obovate, glabrous: several fl.-whorls at end of brts.; the lower in the axils of connate lvs., the upper in the axils of bracts, close; bractlets about half as long as ovaries, those of upper fls. smaller; corolla 4–5 cm. long, yellowish, usually purple outside and glandular-pubescent or glandular, fragrant. Fl. VI–VII. S.O.2:t.106(c). F.S.11: t.1120(c, as *L. Caprifolium major*). Gn.45:307(as *L. etrusca* and *L. Caprifolium*); 54:26. (*L. italica* Schmidt, *L. grata* Ait.) Orig. before 1750. Zone V.—Var. **rubélla** Rehd. Fls. pale purple.—Var. **atrosanguínea** Rehd. Fls. dark purple.

66. **L. Heckrôttii** Rehd. (? *L. americana* × *sempervirens*). Shrub with sarmentose or slightly twining brs., glabrous: lvs. subsessile, elliptic to elliptic-

oblong, 3–6 cm. long, acute or acutish, glaucous beneath: fls. in elongated peduncled spikes, with several remote whorls; bractlets about half as long as ovaries; corolla 3.5–5 cm. long, sparingly glandular and purple outside, yellowish and sparingly hairy within. Fl.VI–IX. Gn.85:502;89:638. B.H.3:89(h). Origin unknown, before 1895. Zone V.—Very floriferous handsome form.

67. **L. tragophýlla** Hemsl. High climbing; brts. glabrous: lvs. short-petioled, oblong, rarely elliptic, 5–12 cm. long, acute to obtuse, cuneate, glabrous and bright green above, glaucous beneath and pubescent at least along the midrib, the upper pair connate: fls. in terminal short-peduncled glabrous heads of usually 2 whorls; corolla 7–8 cm. long, bright yellow, glabrous outside, sparingly pubescent within; tube nearly 3 times as long as limb. Fl.VI. B.M.8064(c). G.C.III.62:39;71:271(h);78:7.t(h). W. China. Intr. about 1900. Zone (V).—Very handsome with its large yellow fls.

68. **L. splèndida** Boiss. Evergreen twining shrub: lvs. of flowering brts. sessile or connate at base, obovate-oblong to oblong, 2–5 cm. long, obtuse, grayish green, glaucous beneath, glabrous, usually more than 2 pairs connate; sterile brs. with smaller, petioled, oval or ovate, usually pilose lvs.: fls. fragrant in dense sessile glandular-pubescent spikes of 3–5 whorls; bractlets ¼–⅓ as long as ovaries; corolla 4–5 cm. long, yellowish white, purple and glandular outside; tube about 1½ times as long as limb. Fl.VII. F.S.11:t.1130(c). Gt.39:65. Spain. Cult. 1880. Zone VII or VIII.—A very handsome and desirable species, but tender.

69. **L. etrúsca** Santi. Evergreen or half-evergreen high-climbing; young brts. glabrous, usually tinged purple: lvs. short-petioled, obovate to broad-oval or elliptic, 3–8 cm. long, obtuse or acutish, usually glabrous above, pubescent beneath and glaucous, rarely glabrous, the upper ones connate: fls. fragrant, in dense spikes of several whorls on stalks to 4 cm. long, often in 3's at end of brs., glabrous or glandular; bractlets nearly as long as ovary, suborbicular; corolla 4–5 cm. long, yellowish white, often tinged purple, glabrous or glandular-pubescent outside; tube very slender, about 1½ times as long as limb. Fl.VI–VII. R.I.17:t.121,f.5(c). F.D.28:t.2915(c). Mediterr. Reg. Cult. 1750. Zone VII or VIII.—Var. **pubéscens** Dipp. Lvs. soft-pubescent on both sides, large. Gartenzeit.1886:557. (*L. gigantea* Zab., not Carr.)—Var. **supérba** Wright. Lvs. large, glabrous: fls. creamy-yellow, finally nearly orange. B.M.7977(c). (*L. gigantea* Carr.)—Var. **viscídula** Boiss. Lvs. 3–4 cm. long, densely glandular above, like the brts., glaucous and less glandular beneath. Zone VIII. Asia Minor.

L. e. × *Caprifolium* = *L. americana;* see under No. 65.—There is also a hybrid with *L. implexa.*

70. **L. Periclýmenum** L. WOODBINE. Climbing or scrambling over bushes; young brts. pubescent or glabrous: lvs. all distinct, petioled or the upper pair sessile, ovate or elliptic to ovate-oblong, 4–6 cm. long, acute, sometimes obtuse, dark green above, bluish green beneath, glabrous or slightly pubescent when young: fls. in peduncled spikes of 3–5 whorls; bractlets at least half as long as ovary, glandular; corolla 4–5 cm. long, yellowish white, often slightly tinged purple, glandular outside; tube slender, longer than limb; stamens and style as long as limb. Fl.VI–VIII; fr.VIII–IX. R.I.17:t.121,f.3,4(c). F.D.28:t.2916(c). Eu., N. Afr., Asia Minor. Long cult. Zone V.—Var. **aùrea** Lind. & André. Lvs. yellowish. I.H.18:t.59(c).—Var. **quercìna** West. Lvs. sinuately lobed and often with narrow white margin.—Var. **bélgica** Ait. DUTCH H. Of more shrubby habit: lvs. glabrous, somewhat thickish: fls. purple outside, usually fading to yellowish.—Var. **seròtina** Ait. Fls. dark purple outside,

fading to pale purple, yellow within. Fl.VII–IX. Gn.45:307,t(c). (*L. semperflorens* Goldring.)—Handsome vine with fragrant fls.; the two last named vars. most frequently cult.

Another species with distinct lvs. is **L. Griffithii** Hook. f. & Thoms. Climbing: lvs. broad-ovate to ovate-oblong, glabrous, the pair below the infl. suborbicular, petioled: fls. in a dense peduncled sparingly pilose and glandular head; bractlets of each whorl connate into a cupula as high as ovaries; corolla about 2.5 cm. long, glandular and pilose outside, glabrous inside; tube about as long as limb. S.T.1: t.24. G.C.III.60:43. Afghan. Intr. about 1900. Zone VII?

10. LEYCESTÈRIA Wall. Deciduous shrubs: lvs. opposite, petioled, with or without stipules: fls. in whorls in the axils of leafy bracts, forming terminal spikes; calyx unequally 5-lobed, persistent; corolla funnelform, nearly equally 5-lobed, ventricose above the base; stamens 5; style slender with capitate stigma; ovary 5–8-celled: fr. a many-seeded berry. (After Wm. Leycester, judge in Bengal.) Incl. *Pentapyxis* Hook. f. Two species in the Himal.

L. formòsa Wall. Shrub to 2 m., with hollow stems, glabrous and bloomy when young: lvs. broad-ovate to ovate-lanceolate, 5–18 cm. long, acuminate, cordate, entire or toothed, finely pubescent when young; petiole 5–15 mm. long: spikes drooping, 3–10 cm. long, terminal and axillary: fls. sessile in the axils of purplish bracts 1.5–3.5 cm. long; corolla 1.5–2 cm. long, purplish; calyx with subulate hairy lobes about ⅓ as long as corolla: fr. subglobose, about 1 cm. across, glandular-pubescent, red-purple. Fl.VIII–IX. B.M.3699 (c). Gt.28:181. M.G.23:330(h). Himal., S. W. China. Intr. 1824. Zone VII or VIII.—Conspicuous in bloom on account of its colored bracts.

Fam. 111. **DIPSACEAE** Lindl. TEASEL FAMILY

Herbs or dwarf shrubs: lvs. opposite, rarely whorled, usually lobed, exstipulate: fls. perfect, small, sessile, mostly irregular, surrounded by a cup-shaped scarious involucel and crowded into involucrate heads; calyx various; corolla 4–5-lobed with imbricate lobes; stamens 4, rarely 2–3, adnate to the corolla; ovary inferior, 1-celled and 1-ovuled; style with 2 stigmas: fr. an achene; seed albuminous with straight embryo.—Ten genera and about 150 species in the warm-temp. regions of the Old World.

PTEROCÉPHALUS Vaill. Annual or perennial herbs, rarely shrubs: lvs. opposite: scales of the receptacle small or wanting; involucels with 8 grooves extending to the base and with spreading limb; calyx-limb of 12–24 bristles; corolla 5-fid.; stigma simple or divided. (Greek *pteron*, wing, and *kephale*, head; referring to the feathery appearance of the heads after flowering.) About 20 species chiefly in the Mediterr. Reg.

P. parnássii Spreng. Tufted subshrub, densely gray-pubescent: lvs. ovate, 1–2 cm. long, obtuse, broad-cuneate to truncate at base, incisely crenate-dentate and often pinnatifid at base; petiole often nearly as long as blade; fls. lilac-pink, in depressed-hemispherical heads, 2–3 cm. across; disk-fls. nearly regular; ray-fls. 2-lipped, upper lip with 2 rounded lobes, the lower with 3 ovate obtuse lobes. Fl.VII. B.M.6526(c). (*Scabiosa pterocephala* L.) S. E. Eu. Cult. 1880. Zone VI or VII.—Suited for the rock garden; the fl.-heads conspicuous on account of the long plumose bristles of the calyx.

Fam. 112. **COMPÓSITAE** Adans. COMPOSITE FAMILY

Herbs, shrubs or rarely trees, sometimes twining, often with milky juice: lvs. alternate, rarely opposite or whorled, exstipulate: fls. bisexual or unisexual, regular or irregular, sessile on a flat or conical axis (receptacle) and

forming small or large involucrate heads, sometimes reduced to 1 fl.; calyx reduced to scales, awns or hairs (pappus) or wanting; corolla gamopetalous, 4–5-lobed, regular or ligulate (with an elongated limb on one side), rarely 2-lipped; stamens 4–5; anthers connate into a tube around the style; style 1, with 2, rarely 1 stigma; ovary inferior, 1-celled and 1-ovuled: fr. an achene, often crowned by the persistent pappus; seed exalbuminous.—About 800 genera with about 12000 species in all parts of the world, the woody species chiefly confined to trop. and subtrop. regions.

A. Heads with ray-fls.
  B. Lvs. linear; heads small, yellow, with 3–4 rays ..... 1. *Gutierrezia*
  BB. Lvs. lanceolate to elliptic: rays many.
    C. Lvs. entire or slightly serrulate, tomentose beneath: heads about 8 mm. across.
      D. Lvs. elliptic, 1–2.5 cm. long ..... 3. *Olearia*
      DD. Lvs. lanceolate, 5–12 cm. long ..... 4. *Microglossa*
    CC. Lvs. toothed or lobed, glabrous or pubescent beneath: heads larger. 9. *Chrysanthemum*
AA. Heads without ray-fls.
  B. Lvs. pinnate.
    C. Heads solitary, slender peduncled: lvs. pectinately pinnate, evergreen ... 8. *Santolina*
    CC. Heads in panicles, small: lvs. usually twice pinnate, deciduous ..... 10. *Artemisia*
  BB. Lvs. entire or dentate.
    C. Infl. corymbose: lvs. linear to narrow-lanceolate.
      D. Fls. white: lvs. brown-tomentose beneath, about 6 mm. long ..... 6. *Cassinia*
      DD. Fls. yellow: lvs. larger.
        E. Involucral bracts in several series: lvs. 3–7 cm. long ..... 2. *Chrysothamnus*
        EE. Involucral bracts 4–6, in one series: lvs. 1–2 cm. long ..... 11. *Tetradymia*
    CC. Infl. not corymbose.
      D. Heads paniculate or spicate: lvs. toothed, rarely entire.
        E. Lvs. alternate.
          F. Pappus present: lvs. glabrous ..... 5. *Baccharis*
          FF. Pappus wanting: lvs. tomentose ..... 10. *Artemisia*
        EE. Lvs. at least partly opposite: pappus wanting ..... 7. *Iva*
      DD. Heads solitary: lvs. entire ..... 12. *Pertya*

Tribe 1. ASTEREAE. Lvs. usually alternate, entire or toothed, rarely pinnate; heads radiate or discoid; involucral bracts usually unequal and in many series; receptacle usually naked; disk-fls. usually yellow; anthers without tail at base; style-brs. of pistillate fls. flattened, with marginal stigmatic lines and a hairy triangular to lanceolate appendage; pappus various or none.

1. **GUTIERRÈZIA** Lag. Shrubs or subshrubs, much-branched, usually glabrous, often glutinous: lvs. alternate, linear, entire: heads small, yellow, forming paniculate or fastigiate cymes, of few to several fls.; ray-fls. 1–6, pistillate; disk-fls. usually perfect or a few staminate; involucre oblong to narrow-campanulate, with several imbricated coriaceous bracts; receptacle naked; achenes short, terete, ribbed or angled; pappus of chaffy scales. (After Piedro Gutierrez, correspondent of the botanical garden of Madrid.) About 20 species in W. N. Am., Mex. and S. Am.

G. Saróthrae Brit. & Rusby. BROOM-WEED. Much-branched subshrub to 60 cm., with upright or ascending brs., glabrous or minutely pubescent; heads few-fld., forming rather loose corymbose panicles usually 4–8 cm. across; rays usually 3–4, 1.5–2 mm. long; involucre oblong, about 5 mm. long; scales of pappus linear-oblong; achenes pubescent. Fl.VIII–IX. B.B.3:370. S.H.2:f.472g-k. S.L.215(h). (*G. Euthamiae* Torr. & Gr.) Minn. and Man. to Nev., Calif. and Tex. and n. Mex. Cult. 1900. Zone IV or V?

2. **CHRYSOTHÁMNUS** Nutt. Shrubs: lvs. alternate, rarely opposite, linear to oblanceolate, entire, 1–3-nerved: fls. yellow, tubular, perfect, in small, 3-(–20)-fld. heads; involucre oblong to narrow-campanulate, with narrow appressed and densely imbricated bracts, often forming vertical rows; corolla with upright lobes; style-brs. exserted; achenes narrow, angled, pubescent; pappus a single row of capillary roughened bristles. (Greek *chrysos*, gold,

and *thamnus*, shrub; referring to the color of the fls.) About 25 species in western N. Am.

C. graveòlens Greene. Much-branched shrub to 1.5 m., of aromatic odor when bruised, with very leafy upright brs. white-tomentulose when young: lvs. narrow-linear, 3–7 cm. long, glabrous at maturity: heads 1–1.5 cm. high, very numerous, in terminal corymbs 3–10 cm. across; involucre narrow-campanulate, of oblong or linear-oblong acute glabrous or nearly glabrous bracts in about 4 series; achenes appressed-pubescent; pappus with copious soft bristles. Fl.VIII–X. B.M.8155(c). B.B.3:376. (*C. nauseosus* var. *graveolens* Piper, *Bigelovia g.* Gray.) Mont. and Neb. to Utah and N. Mex. Cult. 1886. Zone VI or VII?—Conspicuous in bloom with its large corymbs of golden-yellow fls.; suited for well drained sunny positions. It contains rubber, though not in sufficient quantity for commercial exploitation.

Related species are: **C. nauseòsus** Brit. Shrub to 1 m.; brts. permanently white-tomentose: lvs. 3–6 cm. long, tomentose; bracts of involucre strongly carinate on back, tomentose: achenes hirsute-strigose. (*Bigelovia graveolens* var. *albicaulis* Gray.) B. C. and Ore. to Mont., Wyo. and Utah. Intr. ?—**C. Douglasii** Clements. Shrub to 1 m.; brts. glabrous or nearly so: lvs. linear-lanceolate, 2–4 cm. long, 2–3 mm. wide, glabrous: involucre glabrous. Wyo. to Colo., Ariz. and Utah. Cult. 1886.

3. **OLEÀRIA** DC. Evergreen shrubs or subshrubs, sometimes small trees: lvs. alternate, rarely opposite, usually tomentose beneath: heads heterogamous, small, with several to many usually white to purple short ray-fls., rarely without; involucre of several rows of bracts with scarious margin; anthers often pointed or minutely caudate at base; achenes terete or slightly compressed, usually 5-ribbed; pappus with several rows of bristles, the outer row often short. (Name referring to the similarity of some species to those of Olea.) Syn.: *Shawia* Forst. About 100 species in Australia and N. Zeal.

O. Haàstii Hook. f. Bushy shrub to 3 m.; young brts. whitish tomentose: lvs. alternate, short-stalked, crowded, elliptic or ovate, 1–2.5 cm. long, obtuse, entire, lustrous dark green above, white-tomentose beneath, leathery: heads about 8 mm. across, in axillary peduncled cymes at end of brs. and forming a flattened corymb 5–8 cm. across; ray-fls. 3–5, white; disk yellow: achenes ribbed, pubescent. B.M.6592(c). G.C.III.49:52(h). Gn.78:473(h). N. Zeal. Intr. 1858. Zone VII or VIII?—One of the most ornamental of the hardier shrubby Composites; several other species are in cult., but they are more tender.

A related genus is **Aster** L. Heads rather large, with conspicuous rays and yellow disk; anthers obtuse at base: fr. usually compressed, without or with 1 or few ribs on the faces. More than 200 species mostly herbaceous. A low shrubby much-branched plant to 50 cm. tall is **A. staticifòlius** Franch. Lvs. spatulate, 1.5–8 cm. long, obtuse or slightly emarginate, glabrous or puberulous, ciliolate, minutely glandular-punctate: heads solitary on slender stalks to 10 cm. high; involucre with 15–18 linear glabrous bracts; disk to 1 cm. across; ray-fls. 15–18, with purple-blue linear limb 1–1.5 cm. long: fr. silky, smooth on one side, obscurely ribbed on the other. B.M.9081(c). G.C.III.60:116. J.L.48:f.25. W. China. Intr. 1906. Zone VII?

MICROGLÓSSA DC. Climbing or upright shrubs: lvs. alternate, usually entire: heads rather small, in panicles or corymbs; ray-fls. pistillate, with short rays, white or bluish; disk-fl. perfect; receptacle flat, naked or nearly so; involucre of narrow bracts in many rows, membranous, the outer shorter: achenes not compressed, with slender pappus-hairs in 1 or 2 rows. (Greek *micros*, small, and *glosse*, tongue; referring to the short rays.) About 10 species in trop. Asia and Himal., also in Afr.

M. albéscens C. B. Clarke. Shrub or subshrub to 1 m.; brs. slightly grooved, grayish pubescent, with ample white pith: lvs. lanceolate, 5–12 cm. long, acute at ends, entire or slightly serrulate, grayish tomentulose beneath: heads about 8 mm. across, in terminal compound corymbs 7–15 cm. across; ray-fls. about 14, narrow, pale lilac-blue or nearly white; disk yellow. Fl.VII–VIII. B.M.6672(c). R.H.1907:523. S.L.272(h). (*Amphirhaphis a.* DC., *Aster cabulicus* Lindl.) Temp. Himal. and China. Intr. about 1840. Zone VII or VIII.—Of little ornamental value.

5. **BÁCCHARIS** L. Deciduous or evergreen shrubs or herbs; glabrous, sometimes viscid or lepidote: lvs. alternate, usually toothed: heads small, many-fld., in terminal panicles or corymbs or axillary, dioecious, white or yellowish, without ray-fls.; involucre of many imbricate bracts; receptacle flat, naked; pistillate fls. with filiform corolla: achenes compressed, usually 10-ribbed; pappus of pistillate fls. of long bristly hairs. (*Bakkharis*, ancient Greek name for different shrubs.) More than 250 species in N. to S. Am.

A. Lvs. petioled, deciduous.....1. *B. halimifolia*
AA. Lvs. sessile, evergreen.....2. *B. patagonica*

1. **B. halimifòlia** L. GROUNDSEL-BUSH. Shrub to 4 m., much-branched: lvs. short-stalked, obovate to oblong, 2–7 cm. long, acute, cuneate, coarsely toothed, the upper ones entire, resinous; heads 4–6 mm. long, in peduncled clusters of 3–5 forming large panicles: achenes about 1 mm. long; pappus about 8 mm. long. Fl.VIII–IX; fr.X–XI. Add.2:t.55(c). Gg.7:113(h). Mass. to Fla. and Tex. Intr. 1683. Zone V.—Conspicuous in fr. with its white pappus.

Related species are: **B. salicìna** Torr. & Gray. Shrub to 1 m.: lvs. subsessile, narrow-oblong to linear-lanceolate, 2–4 cm. long, obtuse or obtusish, slightly toothed or nearly entire. Fl.v–VII; fr.VIII. B.B.3:445. Kansas and Colo. to W. Tex. Cult. 1894. Zone V.—**B. pilulàris** DC. Ascending shrub to 1 m.: lvs. subsessile, elliptic to obovate, 1–2.5 cm. long, toothed. Ore. to Calif. Intr. before 1910. Zone VII or VIII.

2. **B. patagònica** Hook. & Arn. Much-branched evergreen shrub to 3 m.; brts. angled, viscid when young: lvs. sessile, obovate to oblong, 8–20 mm. long, obtuse, cuneate, with few coarse teeth, deep green above, scurfy on both sides: heads axillary, sessile, usually solitary, yellowish white: pappus about 1 cm. long. Fl.v–VI; fr.VIII. Montagne & Decaisne, Voy. Pole Sud, Bot.2:t.26. Patag. Cult. 1880. Zone VII or VIII.

Tribe 2. INULEAE. Lvs. usually alternate, entire or nearly so: heads usually discoid; involucral bracts usually dry and scarious, in several series, sometimes foliaceous or petaloid; receptacle naked or scaly; anthers tailed at base; style various, pappus usually capillary.

6. **CASSÌNIA** R. Br. Evergreen shrubs: lvs. alternate, entire: heads small, in panicles or corymbs, with perfect or a few pistillate fls., without ray-fls.; involucre with scarious colored bracts, the inner often with spreading appendage; receptacle usually with long deciduous scales: achenes with setose pappus. (After Count A. H. G. Cassini, French Botanist; 1781–1832.) About 18 species in Australia, N. Zeal., and S. Afr.

C. fúlvida Hook. f. Shrub to 2 m., with upright brs. viscid when young, yellowish pubescent: lvs. crowded, oblong-obovate to linear-spatulate, 4–8 mm. long, with revolute margin, dark green and slightly viscid above, yellowish tomentulose beneath: heads 5 mm. long, with 5–8 fls., white, in terminal dense corymbs 2–5 cm. across; receptacle with few or without scales. Fl.VI–VII. Gt.39:241. S.L.135(h). (*Diplopappus chrysophyllus* Koehne.) N. Zeal. Cult. 1880. Zone VI?—Ornamental shrub of heath-like appearance.

Tribe 3. HELIANTHEAE. Lvs. usually opposite, at least the lower ones: heads mostly radiate; involucral bracts usually herbaceous, in 1 to many series; receptacle usually scaly; anthers not tailed; style-brs. truncate or appendaged, usually with a ring of hairs below the brs.: pappus never capillary.

7. **ÌVA** L. Herbs or shrubs: lower lvs. opposite, upper alternate, serrate or entire, thickish; heads small, of staminate and a few marginal pistillate fls., not radiate, axillary; involucre with few roundish bracts; receptacle chaffy; anthers scarcely coherent: achenes glabrous or slightly pubescent, compressed, without pappus. (Name of unknown derivation.) About 12 species in N. and C. Am. and in the W. Indies.

I. orària Bartlett. MARSH-ELDER. Shrubby or suffruticose to 1 m., nearly glabrous: lvs. short-petioled, elliptic to lanceolate, 10–15 cm. long, the upper smaller, acute or obtusish, cuneate, serrate, 3-nerved: heads greenish, 4–6 mm. across, axillary, short-stalked, in leafy panicled racemes; involucre hemispheric, with about 5 orbicular-obovate bracts; pistillate fls. about 5. Fl.VII–IX. B.B.3:339. S.H.2:f.475n-o,477a-e. (*I. frutescens* Auth., not L.) Mass. to Md.; salt-marshes. Intr. 1880. Zone V.—Without ornamental merit.

Tribe 4. ANTHEMIDEAE. Usually aromatic or strong-scented: lvs. usually alternate and usually dissected: heads radiate or discoid; involucral bracts imbricate, in 2 to many series, wholly or in part dry and scarious; receptacle scaly, pubescent or naked; anthers not tailed at base: style-brs. of the perfect fls. usually truncate: pappus a short crown or none.

8. **SANTOLÌNA** L. Evergreen subshrubs or herbs, aromatic: lvs. alternate, pinnate: heads many-fld., discoid, yellow or rarely white, solitary on long peduncles; fls. all perfect; involucre campanulate, with appressed imbricate bracts; receptacle chaffy; stigmas truncate: achenes 3–5-angled, without pappus. (Derivation of name doubtful.) About 8 species in the Mediterr. Reg.

S. Chamaecyparíssus L. LAVENDER-COTTON. Much-branched subshrub, with procumbent stem and ascending brs., to 50 cm., whitish tomentose: lvs. pinnate, 1–4 cm. long, with short-oblong obtuse segments: heads yellow, subglobose, 1–2 cm. across, long-peduncled. R.I.16:t.121,f.2(c). F.D.29:t.3030(c). B.S.2:498. Fl.VII–VIII. (*S. incana* Lam.) S. Eu. Cult. 1596. Zone VII or VIII.

A closely related species is **S. vírens** Mill. Green, glabrate: lvs. with shorter, acute pinnae. S. Eu. Intr. before 1727. Zone VII or VIII. (*S. viridis* Willd., *S. Chamaecyparissus* subsp. *viridis* Rouy.)

9. **CHRYSÁNTHEMUM** L. Herbs or subshrubs: lvs. alternate, entire, dentate or lobed: heads rather large and long-peduncled or small and corymbose; radiate disk-fls. perfect; ray-fls. pistillate; involucre of several series of imbricate appressed bracts with usually scarious margin: receptacle flat or convex, naked; achenes angled or ribbed; pappus wanting or reduced to a scale-like border. (Greek *chrysos*, golden, *anthemos*, flower.) About 150 species in Eu., Asia and Afr.

A. Lvs. lobed, deciduous.
B. Lvs. more or less pubescent ..... 1. *C. morifolium*
BB. Lvs. glabrate ..... 2. *C. sibiricum*
AA. Lvs. obtusely serrate, evergreen ..... 3. *C. nipponicum*

1. **C. morifòlium** Ram. FLORISTS' CHRYSANTHEMUM. Suffruticose or nearly herbaceous: lvs. usually ovate in outline 4–12 cm. long, pinnately lobed, with broad obtuse lobes dentate or lobulate, pubescent or tomentose; heads usually several in terminal corymbs, about 5 cm. across, or smaller or much larger,

of various colors; involucre of oblong bracts; the wild form has white ray-fls. and yellow disk-fls.; in the garden forms the fls. are usually all changed into ray-fls. or sometimes into tubular fls. Fl.IX–XII. B.M.327(c). G.C.III. 31:302. B.C.2:755. (*C. sinense* Sabine, *C. hortorum* Bailey.) Intr. from China 1790.—The hardier forms which have smaller fls. are hardy in zone V, the highly developed greenhouse forms with much larger fl.-heads are tender.

2. **C. sibíricum** Fisch. Suffruticose, to 30 cm., with upright stems from a procumbent woody base, glabrous or puberulous toward the end of the brs.: lvs. pinnatifid, 3–5 cm. long, with ovate or elliptic, incised-serrate to lobulate acutish lobes, truncate or broad-cuneate at base and decurrent into the margined petiole 3–5 cm. long in the lower lvs., upper lvs. smaller, short-petioled, with undivided lobes: heads 4–5 cm. across, with white or pinkish rays on solitary slender peduncles forming loose racemes or panicles at end of stems; bracts of involucre oblong, obtuse, scarious, with green midrib and fuscous margin. Fl.IX–X. N. E. Asia. Intr. 1905. Zone V.—Valuable for its late blooming season.

3. **C. nippónicum** Sprenger. Evergreen subshrub, to 50 cm., glabrous: lvs. subsessile, oblanceolate to oblong-obovate, 6–10 cm. long, obtuse, cuneate, irregularly dentate with small obtusish teeth, dark green above, paler beneath, thickish: heads solitary, 5–7 cm. across, on stalks 4–10 cm. long; involucre hemispherical, the oval, obtuse bracts with scarious margin; ray-fls. white, linear, minutely 5-toothed; disk pale greenish yellow. Fl.IX–X. B.M.7660(c). R.H.1905:47. G.C.III.24:349. (*Leucanthemum n.* Franch.) Japan. Cult. 1895. Zone VII.—Chiefly valued for its late blooming season.

10. **ARTEMÌSIA** L. Herbs, subshrubs or shrubs, aromatic: lvs. alternate, entire, dentate or lobed: heads small and inconspicuous, yellowish or whitish, without ray-fls., in terminal leafy spikes or panicles; involucre with imbricate bracts in few series, the outer shorter; receptacle not chaffy: fls. all or only the marginal ones fertile; stigmas truncate; achenes without pappus. (Mythological name, wife of Mausolus.) About 200 species chiefly in the n. hemisphere.

A. Lvs. lobed or dissected.
  B. Lvs. finely dissected; receptacle usually glabrous.
    C. Lvs. glabrous or slightly pubescent, with long filiform segments....1. *A. Abrotanum*
    CC. Lvs. pubescent, at least beneath; pinnae pectinately pinnatifid with linear-lanceolate segments....2. *A. sacrorum*
  BB. Lvs. coarsely lobed; receptacle pubescent: all fls. fertile.
    C. Lvs. 5–12 cm. long, with oblong lobes....3. *A. Absinthium*
    CC. Lvs. 1–4 cm. long, with short linear lobes....4. *A. frigida*
AA. Lvs. 3-toothed at apex or entire, cuneate: fls. all perfect and fertile....5. *A. tridentata*

1. **A. Abrótanum** L. SOUTHERNWOOD. Subshrub to 1.5 m., with upright brs. glabrous or puberulous when young: lvs. 2–6 cm. long, simply to thrice pinnate, with linear obtuse lobes usually exceeding 1 cm., glabrous or slightly pubescent: heads very numerous, several-fld., 4–5 mm. across, yellow, with perfect fls. and marginal pistillate fls., all fertile: involucre nearly hemispherical, pubescent; outer bracts lanceolate, acute, inner obovate. Fl.VIII–X. R.I.16:t.150,f.2(c). F.D.29:t.3006(c). B.B.3:526. S.L.104(h). S. Eu. Long cult. and often escaped. Zone V.—Grown for its aromatic odor.

Related species are: **A. procèra** Willd. Subshrub to 2.5 m., more spreading; lvs. 5–8 cm. long, thrice pinnate, dark green: fls. yellowish green, smaller; involucre glabrous. S. E. Eu. and Asia Minor. Cult. 1800; sometimes escaped. Zone V.—**A. camphoràta** Vill. Subshrub to 70 cm.: lvs. green and glabrous or nearly so, dotted, lower ones thrice pinnate, with rather few pinnae, the upper entire; petioles auriculate; heads nodding, in narrow panicles; involucral bracts linear, obtuse. R.I.16:t.142,f.2. S. Eu. N. Afr. Intr. 1820. Zone V.—The closely related **A. suàvis** Jord. differs chiefly in its naked receptacle: lvs. with few long

linear, segments: heads nodding, peduncled, 5 mm. across. Rouy, Ill. Pl. Eu. Rar. 8:t.186. S. France. Cult. 1904. Zone VI or VII?

2. **A. sacrórum** Ledeb. Subshrub to 1.5 m., gray-pubescent: lvs. slender-petioled, ovate in outline, 4–7 cm. long, twice pinnate, pinnae pectinately divided, with linear or linear-oblong acute segments, pubescent beneath; rachis and petiole winged: heads 15–20-fld., about 3 mm. across, with pistillate marginal fls., in slender racemes forming large terminal panicles 15–40 cm. long; involucre villous, outer bracts lanceolate, the inner elliptic with scarious margin. Fl.VIII–IX. S. Russia, Siberia to N. E. Asia. Cult 1828. Zone V.—Var. **víridis** Taylor. SUMMER-FIR. Green. Usually grown as an annual; of pyramidal habit with much dissected bright green foliage.

Related species are: **A. póntica** L. ROMAN WORMWOOD. Shrub to 1.5 m.: lvs. twice pinnatisect, 1.5–5 cm. long, pinnae pinnatifid with linear lobes, gray-pubescent; heads whitish yellow, small, in large and narrow panicles. R.I.16:t.150.f.3(c). F.D.29:t.3007(c). B.B.3:527(c). Eu.; escaped in the N. E. States. Cult. 1810. Zone V.—**A. austríaca** Jacq. Subshrub, grayish tomentulose; lvs. suborbicular in outline, 6–15 mm. long, twice pinnatisect, upper lvs. subsessile, almost digitately divided, the uppermost entire: heads small, in narrow dense panicles. R.I.16:t. 143,f.2(c). S. E. Eu. to Altai Mts. Cult. 1810. Zone V.

3. **A. Absínthium** L. WORMWOOD. Subshrub to 1.5 m., whitish silky; lvs. 5–12 cm. long, the lower long-petioled, twice or thrice pinnate, with lanceolate, obtuse lobes: heads short-stalked, hemispherical, 4–5 mm. broad, yellow, numerous in large leafy panicles; outer bracts of involucre linear; marginal fls. pistillate. Fl.VII–X. R.I.16:t.138,f.1(c). F.D.29:t.3001(c). B.B.3:525. Eu. Long cult. and often escaped. Zone V.—Grown for medicinal use as a vermifuge; in Eu. a liquor "absinth" is made from it.

A related species is **A. arboréscens** L. Shrub to 1 m., with erect and angled brs., silvery white: lower lvs. to 10 cm. long and petioled, twice to thrice pinnate with linear lobes; heads about 7 mm. across, in 1-sided racemes. Fl.V–VI. R.I.16: t.138,f.2(c). S.H.2:f.478m-r,479c. S. Eu. Intr. 1640. Zone VIII?

4. **A. frígida** Willd. Subshrub with procumbent stems and ascending brs., to 50 cm., silky-canescent: lvs. 1–4 cm. long, ternately or quinately divided into linear entire lobes, the lower ones petioled and often auricled, the upper sessile: heads about 4 mm. across, numerous, in racemes or raceme-like panicles; involucre hemispherical, with oblong canescent bracts. Fl.VIII–IX. B.B.2:525. Yukon and Minn. to Idaho and w. Tex.; also in Siberia. Intr. 1597. Zone III?—Handsome plant for the rock garden.

5. **A. tridentàta** Nutt. SAGE-BRUSH. Much-branched shrub to 3 m.; silvery-canescent: lvs. sessile, narrowly cuneate, 1–4 cm. long, 3–7-toothed at the truncate apex: heads 5–8-fld., 2–3 mm. broad, very numerous, sessile or nearly so, in large dense panicles 30–50 cm. long; involucre oblong, the inner bracts oblong obtuse, the outer shorter, ovate, tomentose; fls. all perfect and fertile. Fl.VIII–IX. B.B.3:530. S.L.61(h). B. C., Mont. and Neb. to Calif., Utah and Colo. Cult. 1894. Zone V.

Related species are: **A. càna** Pursh. Shrub to 60 cm.; lvs. linear to narrow-lanceolate, 3–5 cm. long, acute and usually entire, rarely with 2 or 3 acute teeth; heads forming a narrow almost spike-like panicle; involucre campanulate, 3–5 mm. broad. B.B.3:530. Neb. to Colo., N. Dak. and Sask. Intr. before 1903. Zone V. —**A. arbúscula** Nutt. To 30 cm. tall: lvs. 3-lobed, with obovate often 2-lobed lobes: heads upright, in spike-like panicles. Colo. and Wyo. to Sask. Intr. ? Zone V?

Tribe 5. SENECIONEAE. Lvs. usually alternate; heads commonly radiate; involucral bracts mostly equal, not scarious, in 1 or 2 series, with or without accessory bracts at base; receptacle naked; anthers usually tail-less at base; style-brs. truncate or obtuse, with or without appendages, usually more or less hairy; pappus capillary.

11. **TETRADÝMIA** DC. Low rigid shrubs, gray- or white-tomentose; lvs. alternate, entire: heads with few fls. usually all perfect and fertile, in

terminal corymbs; involucre oblong or cylindric, of one series of 4–6 concave overlapping bracts; receptacle flat; corolla with lanceolate spreading lobes; anthers with triangular tips, sagittate at base; style-brs. flat, obtuse: achenes terete, 5-nerved; pappus of numerous white, minutely scabrid bristles. (Greek *tetradymos*, fourfold; referring to the number of fls. and involucral bracts.) About 6 species in western N. Am.

T. canéscens DC. Shrub to 1 m., densely white-tomentose: lvs. linear to narrow-lanceolate, 1.5–3 cm. long, acute and spinulose, silky-villous: heads 4–5-fld., 1.5 cm. high, yellow, peduncled, in terminal clusters of 3–5, usually forming broad corymbs at end of brs.; involucre cylindric, with 4 linear-oblong bracts; achenes densely silky-hirsute. Fl.VII–VIII. S.H.2:f.400g-m,481 e-f. B. C. to Calif., Idaho and Utah. Intr. ? Zone V?

A related genus is **Senécio** L. differing chiefly in the many-fld. heads and the many involucral bracts usually with bractlets at the base. The only fruticose species possibly hardy within our area is **S. scandens** Buch.-Hamilt. Scandent subshrub to 5 m.: lvs. ovate-lanceolate, 4–7 cm. long, acuminate, rounded or hastate at base, dentate or denticulate, sometimes lobed at base: fls. yellow, in corymbs forming large terminal panicles; heads with the ray-fls. 2.5–3 cm. across; involucre glabrous. Wight, Icon.t.1136. Himal., W. China. Cult. 1924. Zone VIII?

Tribe 6. MUTISIEAE. Lvs. usually alternate and entire; heads with or without rays; involucral bracts imbricate, usually in many series: corolla bilabiate, deeply 5-cleft, or ligulate; receptacle usually naked; anthers long-tailed at base; style-brs. usually short, not appendaged: pappus usually capillary.

12. **PÉRTYA** Schultz Bip. Deciduous shrubs: lvs. alternate, often crowded under the fl.-heads, entire or serrulate: heads solitary, terminal on short brts., of 4–15 perfect fls.; involucre campanulate, with few large imbricate bracts; corolla tubular, deeply 5-lobed; style hairy on upper part, shortly 2-lobed: achenes pubescent, with conspicuous whitish or purplish pappus. (After A. M. Perty, professor of natural history at Berne, Switzerland.) Four species in E. and C. Asia.

P. sinénsis Oliv. Slender upright shrub to 2 m.: lvs. ovate to oblong-lanceolate, 5–8 cm. long, acutish, entire, often with 1–3 sharp teeth, on year-old brs. fascicled, smaller and entire; heads pinkish, 10–12-fld., about 1 cm. across, on slender pedicels 1–2.5 cm. long; involucre nearly glabrous; achenes sericeous; pappus whitish. Fl.VI–VII. H.I.23:t.2214. C. China. Intr. 1901. Zone I.—Botanically interesting but of little ornamental merit.

GLOSSARY

Abortive. Imperfectly or not developed; barren.
Achene. A dry indehiscent, 1-celled and 1-seeded fruit or carpel.
Acicular. Needle-shaped.
Aculeate. Prickly; beset with prickles.
Acuminate. Tapering at the end; long-pointed.
Acute. Sharp-pointed; ending in a point.
Adnate. United with another part, as the filament with the corolla-tube or an anther attached for its whole length to the filament.
Aestivation. The arrangement of the parts of the perianth in the bud.
Albumen. The nutritive material surrounding the embryo in the seed.
Albuminous. Having albumen.
Alternate. Not opposite to each other on the axis.
Ament. A catkin.
Amphitropous (ovule). Half-inverted and straight with the hilum lateral.
Anastomosing (veins). Connecting by cross-veins and forming a network.
Anatropous (ovule). Inverted and straight with the micropyle next to the hilum.
Andro-dioecious. Staminate and bisexual flowers on different plants.
Androgynophore (or *Androphore*). Stipe-like elongation of the floral axis between perianth and stamens.
Androgynous. With both staminate and pistillate flowers in the same inflorescence.
Andro-monoecious. Staminate and bisexual flowers on the same plant.
Angiospermous. Having the seeds borne within a pericarp.
Annular. In the form of a ring.
Anterior. On the front side of the flower toward the subtending bracts.
Anther. The pollen-bearing part of the stamen.
Apetalous. Having no petals.
Apical. At the apex or summit of an organ.
Apiculate. Contracted into a minute point.
Apophysis (in Pinus). The exposed, mostly swollen part of the cone-scales.
Appressed. Lying close and flat against.
Aril. An appendage growing out from the hilum and covering the seed partly or wholly.
Aristate. Awned; tipped by a bristle.
Articulate. Jointed; having a node or joint.
Ascending. Rising somewhat obliquely and curving upward.
Attenuate. Slenderly tapering.
Auriculate. Furnished with ear-shaped appendages (auricles), as the base of a petal or leaf.
Awl-shaped. Tapering from the base to a slender and stiff point.
Axil. The upper angle formed by a leaf or branch with the stem.
Axillary. Situated in an axil.
Axis. The central line of an organ or the support of a group of organs.

Baccate. Berry-like; pulpy or fleshy.
Basifixed, Attached or fixed by the base.
Beaked. Ending in a beak or prolonged tip.
Bearded. Ending in a long awn or furnished with long or stiff hairs.
Berry. A fruit with a fleshy or pulpy pericarp.
Bi- or *bis-.* A Latin prefix signifying two or twice.
Bifid. Two-cleft.
Bilabiate. Two-lipped.
Bisexual. Having both stamens and pistils; hermaphrodite.
Blade. The expanded portion of the leaf.
Bract. A modified reduced leaf subtending a pedicel or peduncle or belonging to an inflorescence or occurring at the base of shoots.
Bractlet. A secondary bract, particularly as borne on the pedicel.
Bracteate. Having bracts.
Bullate. Blistered or puckered.

Caducous. Falling off very early.
Calyx. The outer perianth of the flower.
Campanulate. Bell-shaped.
Canaliculate. Longitudinally channeled.
Canescent. Gray-pubescent and hoary.
Capitate. Head-like; collected into a dense cluster.
Capsular. Belonging to or of the nature of a capsule.
Capsule. A dry dehiscent fruit of more than one carpel.
Carinate. Keeled.
Carpel. A simple pistil or a member of a compound pistil.
Catkin. A scaly-bracted spike of usually unisexual flowers.
Cell. One of the minute vesicles of which plant tissues are formed; also a cavity of an anther or ovary.
Chaff. A small thin scale or bract; particularly on the receptacle of the Compositae.
Channeled. Deeply grooved longitudinally.
Chartaceous. Having the texture of stiff writing paper.
Ciliate. Fringed with hairs.
Ciliolate. Minutely ciliate.
Circumscissile. Dehiscing by a transverse circular line; the upper part usually coming off as a lid.
Clasping. Said of the base of a leaf partly or wholly surrounding the stem.
Clavate. Club-shaped; gradually thickened upward.
Cleistogamous. Closed, self-fertilized flowers.
Coalescent. Two or more similar parts united.
Coherent. Two or more similar parts or organs joined.
Columnar. Having the shape of a column.
Compound. Composed of two or more similar parts as a compound leaf, or an inflorescence with the flowers on axes of the second or an higher order.
Conduplicate. Folded together lengthwise.
Conelet. The young cone in Pinus during the first season after fertilization.
Connate. United; joined into one organ.
Connective. The portion of the stamen which connects the cells of an anther.
Connivent. Converging; coming together, but not connate,

Convolute. Rolled up longitudinally.
Cordate. Heart-shaped; usually referring to the base of a leaf with two rounded lobes and a sinus.
Coriaceous. Of leathery texture.
Corolla. The inner series of floral envelopes, consisting of either connate or distinct petals.
Corona. An appendage on the inside of the corolla, usually near the throat.
Corymb. A flat-topped or convex flower-cluster with the outer flower opening first.
Cotyledon. The primary leaf or leaves in the embryo.
Crenate. Toothed with rounded, shallow teeth.
Crenulate. Finely crenate.
Crested. With an irregular or toothed ridge.
Crown. Same as corona or an annular outgrowth at the top of an organ.
Culm. The stem of grasses and sedges.
Cuneate. Wedge-shaped; triangular, with the narrow end at point of attachment.
Cuspidate. Sharp-pointed; ending in a sharp pointed cusp.
Cyme. A convex or flat flower-cluster of the determinate type; the central flowers opening first.
Cymose. Arranged in cymes; cyme-like.

Deciduous. Falling, not persistent.
Decompound. More than once compound.
Decumbent. Reclining, but with the ends ascending.
Decurrent (leaf). Extending down the stem below the insertion.
Decussate. Alternating in pairs at right angles; opposite leaves forming four longitudinal rows.
Dehiscent. Opening to emit the contents, as a capsule or anther.
Deltoid. Triangular; delta-like.
Dentate. Toothed with the teeth directed outward.
Denticulate. Minutely dentate.
Depressed. Flattened from above.
Di, dis. Greek prefix, signifying two or twice.
Diaphragm. A cross-partition at the nodes of hollow or pithy stems or branches.
Dichotomous. Forked regularly in pairs.
Didynamous. With four stamens in pairs of unequal length.
Diffuse. Loosely or widely spreading.
Digitate. With the members arising from one point.
Dimorphous. Occurring in two forms.
Dioecious. Staminate and pistillate flowers on different plants.
Diplostemonous. Flowers with twice as many stamens as petals, the outer opposite to the sepals.
Discoid. Resembling a disk; discoid head (in Compositae), one without ray-flowers.
Disk. A development of the receptacle at or around the base of the pistil.
Dissected. Divided into many narrow segments.
Dissepiment. A partition in an ovary or fruit.
Distichous. Arranged in two vertical ranks; two-ranked.
Distinct. Separate; not united with parts of the same series; not connate; also evident.
Divaricate. Spreading; widely divergent.
Divided. Separated to the base.
Dorsal. Relating to the back or outer surface of an organ.
Double. Said of flowers with more than the normal number of floral envelopes, particularly of petals.
Drupe. A fleshy indehiscent fruit with a bony, usually one-seeded endocarp.
Drupelet. A drupe in a fruit consisting of an aggregate of small drupes as in Rubus.

E, ex. A Latin prefix usually denoting that parts are missing, as exstipulate, without stipules.
Ellipsoid. A solid body elliptic in section.
Elliptic. With an outline of an ellipse and about two times as long as wide.
Emarginate. With a shallow notch at the apex.
Embryo. The rudimentary plant within the seed.
Endocarp. The inner layer of the pericarp.
Entire. Without toothing or division.
Epigynous. Borne on the top of the ovary.
Epiphytic. Growing on other plants, but not parasitic.
Erose. With jagged margin, as if gnawed.
Exalbuminous. Without albumen.
Excurrent. With a projecting tip, as the nerve of a leaf projecting beyond the margin.
Exfoliating. Peeling off in thin layers.
Exocarp. The outer layer of the pericarp.
Exserted. Prolonged beyond the surrounding organs, as stamens from the corolla.
Exstipulate. Without stipules.
Extrorse. Facing outward.
Eye. The differently colored centre of a flower.

Falcate. Sickle- or scythe-shaped.
Fascicle. A dense cluster.
Fascicled. Borne in dense clusters; said of several or many long hairs arising from a common base.
Fastigiate. With stems or branches erect and near together.
Ferrugineous. Rust-colored.
Fertile. Capable of producing fruit or seeds; also said of pollen-bearing anthers.
Fibro-vascular. Composed of woody fibres and ducts.
Filament. The stalk of an anther.
Filiform. Thread-like; very slender and terete.
Fimbriate. Fringed.
Flaccid. Not rigid; lax and weak.
Floccose. Clothed with flocks of soft hair or wool.
Floriferous. Flower-bearing.
Foliaceous. Leaf-like in texture or appearance.
Follicle. A dry dehiscent fruit or carpel opening only along one suture.
Foveolate. Pitted.
Free. Not joined to other organs; not adnate.
Fruit. The seed-bearing product of a plant.
Fruticose. Shrubby; with woody persistent stems and branches.
Frutescent. Nearly shrubby.
Fugacious. Falling or withering away very early.
Funicle. The stalk of an ovule or seed.
Funnelform. Said of a corolla with the tube gradually widening upward into the spreading limb.
Furrowed. With longitudinal channels or grooves.
Fuscous. Grayish brown.
Fusiform. Spindle-shaped, narrowed toward the ends from a swollen middle.

Gamopetalous. Having the petals more or less united.
Geniculate. Bend abruptly like a knee.
Gibbous. Swollen on one side.
Glabrate. Nearly glabrous or becoming glabrous with age.
Glabrescent. Becoming nearly glabrous with age.
Glabrous. Not hairy.
Gland. A secreting part or appendage, but often used for gland-like organs.
Glandular. Bearing glands or gland-like appendages.
Glaucous. Covered with a bloom; bluish white or bluish gray.
Glomerate. In compact clusters.
Glume. A chaff-like bract; particularly one of the two empty bracts at the base of the spikelet in grasses.
Granular, granulose. Composed of or appearing as if covered by minute grains.
Gymnospermous. Bearing naked seeds, without an ovary.
Gynophore. The stipe of an ovary.
Gynostegium. The structure resulting from the union of stamens and pistil in Asclepiadaceae.

Hastate. Halberd-shaped;like an arrow-head, but with the basal lobes pointing outward nearly at right angles.
Head. A dense cluster or short dense spike of sessile or nearly sessile flowers.
Heart-shaped; see cordate.
Heteromorphous. Parts of different shape.
Hilum. The scar or point of attachment of the seed.
Hirsute. With rather coarse or stiff hairs.
Hirtellous. Minutely hirsute.
Hispid. Beset with rigid hairs or bristles.
Hispidulous. Minutely hispid.
Hoary. Covered with a close whitish or grayish white pubescence.
Homogamous. Bearing only one kind of flowers.
Homomorphous. Parts of like shape.
Hybrid. A plant resulting from a cross between two or more parents that are more or less unlike.
Hypanthium. The cup-shaped or tubular receptacle on which the perianth and the stamens are inserted.
Hypogynous. Borne on the receptacle beneath the ovary; said of stamens and petals.
Hypostyle. The free portion on the ventral side of the stone in Crataegus and Cotoneaster, differing conspicuously in texture from the rest of the stone.

Imbricate. Overlapping, as shingles on a roof.
Incised. Sharply and more or less deeply and irregularly cut.
Included. Not protruding or exserted.
Indehiscent. Not opening.
Inferior. Beneath or below, as an inferior ovary, one that is below the perianth.
Inflated. Blown up; bladdery.
Inflorescence. The flowering part of the plant; mode of flower-bearing.
Infra-. In composition, below; as infrastipular, below the stipules.
Inserted. Attached.
Inter- or *intra-.* In composition, between, as interpetiolar, between the petioles of opposite leaves like the stipules of many Rubiaceae.
Internode. The portion of the stem between two nodes.
Introrse. Facing inward toward the axis.
Involucel. A secondary involucre.
Involute. Rolled inward.
Irregular flower. Some parts different from other parts of the same whorl; usually applied to zygomorphous flowers.

Keel. A central ridge; the two anterior united petals of a papilionaceous flower.

Laciniate. Cut into narrow pointed lobes.
Lamellate. Having thin flat plates or a laterally flattened ridge, as lamellate pith, one consisting of thin transverse plates, also called chambered.
Lanceolate. Lance-shaped, about 4 times as long as wide and broadest below or about the middle.
Leaf-cushion. In Conifers the basal part of the leaf decurrent on the stem.
Leaflet. Part of a compound leaf.
Legume. A dry fruit dehiscent by both sutures, as the fruit of the Leguminosae.
Lemma. The lower of the two bracts enclosing the flower in the Grasses.
Lepidote. Beset with small scurfy scales.
Ligneous, Woody.
Ligulate. Provided with or resembling a ligule.
Ligule. A strap-shaped organ; a usually scarious projection from the summit of the sheath in the Grasses.
Limb. The expanded part of a petal, sepal or of the corolla.
Linear. Long and narrow with nearly parallel margins.
Lip. The divisions of a two-lipped corolla.
Lobe. A segment of an organ, particularly if rounded.
Lobed. Divided into or bearing lobes.
Lobulate. Divided into small shallow lobes.
-locular. In composition, having locules or cells , as bilocular, two-celled.
Loculicidal. Dehiscent on the back of the cells of a capsule.
Lyrate. Pinnatifid with a large terminal lobe and small basal lobes.

Marcescent. Withering but persistent.
Medullary. Pertaining to the pith or medulla.
Membranous. Thin and rather soft.
Mesocarp. The middle layer of a pericarp.
Micropyle. The orifice of the ovule and the corresponding place in the seed.
Midrib. The central vein or rib of a leaf.
Monadelphous. Stamens united in one group by their filaments.
Moniliform. Resembling a string of beads, as the legume of Sophora.
Monoecious. With unisexual flowers of both sexes on the same plant.
Mucronate. Tipped with a short abrupt point or mucro.
Mucronulate. With a minute mucro.
Multinodal; see p. 54.
Muricate. Roughened with short hard points.
Mutic. Said of the unarmed and obtuse umbo of the cone-scales in Pinus.

Naked flower. A flower without perianth.
Nectary. A place or organ where sugar or nectar is secreted.
Nerve. A slender unbranched rib or vein.
Node. The place upon the stem which normally bears a leaf or leaves.

Nut. An indehiscent one-seeded hard and bony fruit.
Nutlet. A small nut.

Ob-. Latin prefix usually signifying inversion.
Obcordate. Inversely heart-shaped.
Obdiplostemonous (flowers). With twice as many stamens as petals and the outer one opposite to the petals.
Oblanceolate. Lanceolate but broadest near the apex.
Oblique. Unequal-sided.
Oblong. About 3 times as long as wide and with nearly parallel sides.
Obovate. Inversely ovate.
Obovoid. Inversely egg-shaped.
Obsolete. Not evident; rudimentary.
Ochrea (also ocrea). A tubular stipule or a pair of stipules united into a sheath.
Odd-pinnate (leaf). Pinnate with a terminal leaflet.
Orbicular. Circular; round in outline.
Orthotropous (ovule or seed). Erect with the micropyle at the apex.
Oval. Broad-elliptic, about 1½ times as long as broad and round at the ends.
Ovary. The ovule-bearing part of the pistil.
Ovate. Having an outline like a hen's egg.
Ovule. The body which after fertilization becomes the seed.

Palea. The upper bract which with the lemma encloses the flower in Grasses.
Paleaceous. Chaffy.
Palmate (leaf). Radiately lobed or divided, with 3 or more veins arising from one point.
Pandurate. Fiddle-shaped; constricted about the middle.
Panicle. A compound inflorescence of the racemose type with pediceled flowers.
Panicled, paniculate. Borne in a panicle or resembling a panicle.
Papilionaceous (corolla). Having a standard, wings and keel.
Papillose. Bearing minute nibble-shaped projections.
Pappus. The modified calyx-limb in Compositae, forming a crown of bristles, awns or scales.
Parietal. Borne on or pertaining to the wall of a fruit.
Parted. Cleft nearly but not quite to the base.
Pectinate. Comb-like; pinnatifid with narrow, closely set segments.
Pedate. Palmately divided with the lateral segments 2-cleft.
Pedicel. The stalk of a flower.
Pediceled or *pedicellate.* Borne on a pedicel.
Peduncle. The stalk of a flower-cluster; also used for the stalk of a solitary flower.
Peduncled or *pedunculate.* Borne on a peduncle.
Peltate. Shield-shaped; attached to its stalk inside the margin.
Pendulous. Hanging.
Penninerved. Nerves arising along a central midrib.
Perfect (flower). Having both stamens and pistil; bisexual.
Perianth. The floral envelope; commonly used when there is no clear distinction between calyx and corolla.
Pericarp. The wall of the ripened ovary.
Perigynous. Borne around the ovary and not at its base, as in flowers in which perianth and stamens are borne on a cup-shaped hypanthium.
Persistent. Remaining attached; not falling off.
Petal. One of the separate leaves of the corolla.
Petaloid. Petal-like; resembling a petal in color and shape.
Petiole. Leaf-stalk.
Petioled. Having a petiole.
Petiolule. Stalk of a leaflet.
Pilose. With soft long straight hairs.
Pinna. A primary division of a pinnate leaf.
Pinnate (leaf). Compound, with the leaflets placed on each side of the rachis.
Pinnatifid. Cleft or divided in a pinnate way.
Pinnatisect. Cleft to the midrib in a pinnate way.
Pinnule. A secondary pinna.
Pistil. The seed-bearing organ of the flower consisting of ovary, style and stigma.
Pistillate. Having a pistil and no stamens.
Pitted. Marked with pits or small depressions.
Placenta. Part of the ovary which bears the ovules.
Plicate. Folded into plaits.
Plumose. Feathery; furnished with long hairs, as the tail of the achene in some Clematis.
Pod. A dry dehiscent fruit.
Pollen. Spores or grains borne by the anther, usually granular.
Polygamous. Bearing unisexual and bisexual flowers on the same plant.
Pome. A fleshy fruit like the apple and the pear.
Posterior. In an axillary flower the side nearest the axis.
Prickle. A spine-like outgrowth from the bark or epidermis.
Procumbent. Lying on the ground or trailing.
Prostrate. Lying flat on the ground.
Pruinose. Bloomy.
Puberulent or *puberulous.* Minutely pubescent.
Pubescent. Covered with hairs, particularly if short and soft.
Punctate. With translucent or colored dots or depressions.
Pungent. Termination in a rigid sharp point; acrid.
Pyriform. Pear-shaped.

Raceme. A simple inflorescence of stalked flowers on a more or less elongated rachis.
Racemose. In racemes or resembling a raceme.
Rachis. An axis bearing flowers or leaflets.
Radiate. Spreading from a common centre; with ray-flowers.
Radicle. The portion of the embryo below the cotyledons.
Ray. The branch of an umbel; the marginal flowers (ray-flowers) of an inflorescence if distinct; the strap-like part of the corolla of the ray-flowers in Compositae.
Receptacle. The more or less expanded portion of an axis which bears the organs of a flower or the collected flowers of a head.
Recurved. Curved downward or backward.
Reflexed. Abruptly turned downward.
Regular (flower). With the parts of each whorl alike.
Reniform. Kidney-shaped.
Repand. With a slightly sinuate margin.
Resin-ducts. Canals in the plant-tissue containing resin.
Retuse. Slightly notched at the rounded apex.

Revolute. Rolled backward; margin rolled toward the lower side.
Rib. A primary or prominent vein in a leaf.
Rostrate. Having a beak.
Rotate (corolla). Wheel-shaped; with a flat and circular limb and without or with a very short tube.
Rufous. Reddish brown.
Rugose. Wrinkled.

Saccate. Sac-shaped.
Sagittate. Shaped like an arrow-head, with the basal lobes directed downward.
Salver-shaped (flower). With a slender tube abruptly expanded in a flat limb.
Samara. An indehiscent flattened fruit.
Scabrous. Rough to the touch.
Scale. A minute leaf or bract, usually appressed or dry; minute gland-like flat appendages of the epidermis.
Scarious. Thin and dry, not green.
Seed. The ripened ovule consisting of the embryo and its integuments.
Segment. One of the parts of a leaf or other organ that is divided but not compound.
Sepal. A division of the calyx.
Septicidal. Dehiscing along or in the partitions.
Septifragal. Dehiscing with the valves breaking away from the dissepiment.
Septum. A partition.
Sessile. Not stalked.
Setose. Beset with bristles.
Sheath. A tubular envelope.
Sheathing. Enclosing as by a sheath.
Shrub. A woody plant branched from the base.
Silky. Covered with appressed fine and straight hairs.
Sinuate. With a strongly wavy margin.
Sinus. The recess between the lobes.
Smooth. Without roughness; also used in the sense of glabrous.
Spatulate. Gradually narrowed from a rounded summit.
Spicate. Arranged in or resembling a spike.
Spadix. A spike with fleshy axis.
Spike. A simple inflorescence with the flowers sessile or nearly so on a common axis.
Spine. A sharp-pointed woody outgrowth from the stem.
Spinescent. Becoming spiny; with short spine-like branchlets.
Spur. A sac-like or tubular extension of some part or parts of the perianth, usually nectariferous; a short branchlet with much shortened internodes, usually bearing a cluster of leaves.
Stamen. The pollen-bearing male organ of the flower.
Staminode. A sterile stamen or similar structure inserted between the corolla and the pistil.
Standard. The upper broad petal of a papilionaceous flower.
Stellate. Star-shaped; said of hairs with radiating branches or of a cluster of radiating hairs.
Stem. The main axis of a plant.
Sterigmata. The peg-like projections of the leaf-cushions in some Conifers, as in the Spruces.
Sterile. Not fertile; a flower without or with rudimentary pistil, or stamens without fertile pollen.
Stigma. The part of the pistil that receives the pollen.
Stipe. The stalk of a pistil or similar organ.
Stipel. Stipule of a leaflet.
Stipitate. Having a stipe.
Stipular. Belonging to the stipules.
Stipule. An appendage of the base of the petiole, usually one on each side.
Stolon. A subterranean stem; sucker.
Stoloniferous. Bearing stolons or suckers.
Stoma (pl. *stomata*). An orifice in the epidermis of a leaf.
Stomatic or *stomatiferous.* Bearing stomata.
Striate. Marked with fine longitudinal lines.
Strict. Very straight and upright.
Strigose. Beset with appressed straight and stiff hairs.
Strobile. A small cone.
Style. The usually attenuate part of the pistil between the ovary and the stigma.
Subshrub. An undershrub, a suffruticose plant; also applied to a small low shrub.
Subulate. Awl-shaped.
Suffrutescent. Slightly woody; woody at the base.
Suffruticose. A perennial plant with only the lower part of the stem and of the branches woody and persistent.
Sulcate. Grooved or furrowed.
Superior (ovary). Borne above the insertion of the perianth and free from it.
Suture. A line of splitting.
Symmetrical (flower). Having the same number of parts in each whorl.
Syncarp. A fleshy aggregate fruit.

Tapering. Gradually becoming smaller in diameter or width toward one end.
Tendril. A coiling thread-like organ by which a plant grasps an object for support.
Terete. Circular in transverse section.
Ternate. In threes.
Testa. The outer seed-coat.
Thyrse. A compact narrow panicle.
Thyrsoid. Like a thyrse.
Tomentose. With dense woolly pubescence.
Tomentulose. Closely and finely tomentose.
Tomentum. A dense covering of matted hairs.
Tortuous. Twisted or bent.
Tree. A woody plant with one main stem and at least 4 or 5 m. tall.
Tri-. A Latin prefix signifying three or thrice, as trifoliolate, with 3 leaflets.
Truncate. Ending abruptly, as if cut off.
Tumid. Swollen.
Turbinate. Top-shaped; inversely conical.
Turgid. Swollen.

Umbel. An inflorescence with pedicels or branches arising from the same point.
Umbellate. Borne in umbels.
Umbelliform. Umbel-like; resembling an umbel.
Umbo. The parts of the apophysis of the cone-scales of Pinus, usually differing in color, which represents the exposed part of the conelet.
Umbonate. Bearing an umbo or boss.
Undulate. With wavy surface or margin.
Uninodal; see p. 54.
Unisexual. Of one sex, either staminate or pistillate.
Urceolate. Ovoid or cylindric and contracted at the mouth; urn-shaped.

Valvate. Opening by valves; in aestivation, meeting by the edges without overlapping.
Vascular. Furnished with vessels or ducts.
Veins. Threads of fibro-vascular tissue in a

leaf or similar organ; nerves, but especially the smaller branched nerves.
Velutinous. Velvety.
Venation. Arrangement of veins.
Ventral. Relating to the inner face or part of an organ; the part nearer to the axis.
Vernation. The arrangement of leaves in bud.
Versatile. Relating to an anther attached near the middle and moving freely on its support.
Verticillate. Disposed in a whorl.
Villous. Bearing long and soft, usually curved or curly, hairs.
Virgate. Wand-like.

Whorl. An arrangement of three or more organs in a circle around the axis.
Wing. A membranous or thin and dry expansion or appendage of an organ; one of the lateral petals of a papilionaceous flower.
Woolly. Clothed with long and soft and curled or matted hairs.

Zygomorphous. Capable of division by only one plane of symmetry.

ADDITIONS AND EMENDATIONS

Page 16, after **Cupressus macrocarpa** insert:

C. m. × *Chamaecyparis nootkatensis* = **C. Lelândii** A. B. Jacks. Similar in habit, brts. and lvs. to *Chamaecyparis nootkatensis:* cones up to 2 cm. across, with about 5 seeds to each scale. Kew Bull. 1926:114,t(h). Orig. 1888.

Page 19, under **Chamaecyparis obtusa** after Var. **magnifica** insert:

Var. **breviràmea** Reg. Tree of narrow-pyramidal habit, with short brs.; brts. rather thin, close, regularly arranged, the lateral ones overtopping the terminal one: cones slightly smaller. (*C. b.* Maxim.) Japan. Intr. 1919.—Var. **filicoïdes** Beiss. Usually shrubby, of slow growth, with crowded and short brts. of nearly equal length on elongated brs., forming long and narrow frond-like brt.-systems; brts. keeled above. G.C.II.5:235. K.V.221. (*Retinispora f.* Veitch.)—Var. **lycopodioïdes** Carr. Dwarf shrubby form, with irregularly ramified brs., the ultimate brts. crowded, not arranged in one plane, partly fasciated, not or scarcely compressed; lvs. appressed, elongated acute, spirally arranged or indistinctly 4-ranked, dark green. Gs.6:231.—

Page 52, the name **Larix dahurica** should be replaced by **L. Gmelïni** Pilger, with the synonyms *Abies G.* Rupr. and *L. dahurica* Turcz. and with the two vars., var. **Prïncipis Ruppréchtii** Pilger and var. **japónica** Pilger.

Page 67, to **Ephedra distachya** add as synonym: (*E. vulgaris* Rich.)

Page 153, after **Corylus tibetica** insert:

C. t. × *avellana* **C. spinéscens** = Rehd. Similar in habit and lvs. to *C. tibetica:* involucre of fr. not densely covered with spines but only its lobes and teeth ending in rigid spiny points and with a few spiny bristles on the face. Orig. before 1911.

Page 153, after **Corylus chinensis** insert:

C. c. × *avellana* = **C. Vilmorinii** Rehd. Similar to *C. chinensis* in habit: lvs. smaller and less cordate: involucre little constricted above the nut, occasionally split to the base on one side, divided above the apex of the nut into laciniate and toothed nearly upright lobes; nut larger, with thinner shell. Orig. before 1911.

Page 170, under **Quercus serrata** add as note:

According to Koidzumi and to Nakai *Q. serrata* Thunb. is identical with *Q. glandulifera* Bl.; therefore the name for this species becomes **Q. acutíssima** Carruthers with the synonym *Q. serrata* Sieb. & Zucc., not Thunb.

Page 182, under **Q. glandulifera** add as a note:

According to Koidzumi and to Nakai the oldest name for *Q. glandulifera* Bl. is **Q. serrata** Thunb.

Page 208, after **Polygonum multiflorum** insert:

A closely related genus is **Polygonélla** Michx. Annual or perennial, often suffruticose plants; brts. conspicuously jointed, adnate at base to the internode: lvs. small, linear or narrow: pedicels solitary, in slender panicled racemes; the 2 outer sepals spreading or reflexed; stamens 8; styles 3: embryo straight or nearly so. About 6 species in N. Am.—**P. americàna** Small. Subshrub to 0.5 m., glabrous: lvs. linear, 5–20 mm. long: fls. about 4 mm. broad, white or rose, in racemes 2–5 cm. long and forming terminal panicles to 20 cm. long. Gr.M.363. (*P. ericoides* Gray). S. Mo. to Tex. and Ga. Intr. ?

Page 208, after **Brunnichia cirrhosa** insert:

A related genus is **Muehlenbêckia** Meisn. Usually climbing or sometimes prostrate shrubs or subshrubs: lvs. usually small, with small, loosely sheathing stipules: fls. polygamous or dioecious, small, in axillary fascicles or in spikes, rarely solitary; perianth 5-parted; stamens usually 8; styles 3, short; stigmas usually fimbriate: fr. 3-angled, inclosed in the usually succulent perianth. About 15 species in Austral., Polynes., and S. Am.—**M. compléxa** Meisn. Prostrate or climbing subshrub, glabrous, with thin wiry stems minutely warty when young: lvs. orbicular to elliptic, 4–20 mm. long, slender-petioled: fls. 2–3 mm. long, in axillary or terminal short spikes, sometimes panicled: fr. waxy-white, 5–8 mm. across; nutlet black, shining. B.M.8449(c). N. Zeal. Intr. 1842. Zone (V).—**M. axillàris** Walp. Young brts. minutely puberulous: lvs. elliptic or ovate to suborbicular, 2–8 mm. long: fls. axillary, solitary or 2, or the staminate in short terminal spikes. Cheeseman, Ill. N. Zeal. Fl.2:t.165. (*M. nana* Hort.) N. Zeal. Cult. 1902.

Page 231, for **Akebia lobata** Dcne. read **A. trifoliàta** Koidz. and add as synonyms: (*A. lobata* Dcne., *Clematis t.* Thunb.).

Page 242, under 22. **Berberis aggregata** var. **Prattii** insert as a synonym: *B. brevipaniculata* Bean, not Schneid.

Page 244, under No. 27. after **B. asiatica** insert:

—Another related species is **B. lycioìdes** Stapf. Brts. glabrous: lvs. oblanceolate, entire or slightly toothed, glaucescent, but not papillose beneath: infl. usually paniculate; fls. 1 cm. across; pedicels 5–10 mm. long; fr. ellipsoid-oblong, 1–1.2 cm. long, black-purple, with blue-white bloom. B.M.9102(c) Himal. Cult. 1925. Zone VIII?

Page 293, under 7. **Hydrangea serrata** add as synonyms: *H. cuspidata* Koidz., *Viburnum cuspidatum* Thunb.)

Page 306, under No. 19 after Ribes **dikuscha** add:

—**R. fràgrans** Pall. Lvs. shallowly 3–5-lobed, 2–6 cm. across, with short and broad obtuse to acute lobes, pubescent or glabrous beneath, rugose: racemes 4–7 cm. long; fls. white, about 1 cm. across; sepals oblong: fr. brownish. Jancz., Mon. Gros.343(fl.) E. Siberia, Manch. Intr. 1917. Zone V.

Page 343, after 36. **Spiraea betulifolia** insert:

A related species is **S. Fritschiàna** Schneid. Upright shrub to 1, rarely 2 m.; brts. sharply angled, glabrous, lustrous purple-brown: lvs. elliptic or elliptic-ovate to elliptic-oblong, 3–8 cm. long, acute to acuminate, usually cuneate, coarsely simply or doubly serrate, pubescent beneath or nearly glabrous; petiole 2–8 mm. long: infl. 3.5–8 cm. across, dense; fls. white or pink in bud: follicles lustrous, glabrous except pilose on ventral suture. N.K.4:t.6. (*S. koreana* Nakai, *S. angulata* Schneid.) C. China to Korea. Intr. 1919. Zone V.—The plant in cult. has the lvs. thinly villous beneath and the fls. pink in bud.

Page 362, under 3. **Pyracantha Gibbsii** add as a note:

—The plants with elliptic to elliptic-oblong and acute or acutish lvs. represent the type of the species (B.M.9099,f.1-4(c). G.C.III.60:309,f.3; 310;63:47(h);73:23.—*P. atalantoides* Stapf), while those with obovate-oblong or obovate and usually obtuse lvs. may be distinguished as var. **yunnanénsis** Osborn (R.H.1913:204,t,B(c). B.M.9099,f.5-10(c). Gn.83:138;87:52.—*P. y.* Chittenden).

Page 382, after 16. **Sorbus Aria** insert:

S. A. × *Aucuparia* = *S. thuringiaca*, see under No. 12.—*S. A.* × *torminalis* = *S. latifolia;* see No. 14.—*S. A.* × *Aronia arbutifolia* = *Sorbaronia alpina;* see p. 383.—*S. A.* × *Aronia melanocarpa* = *Sorbaronia Dippelii;* see p. 384.—*S. A.* × *Pyrus communis* = *Sorbopyrus auricularis;* see p. 384.

ADDITIONS AND EMENDATIONS

Page 481, after **Albizzia julibrissin** insert:

A closely related species is **A. kalkora** Prain. Lvs. with 4–12 pinnae, each with 10–28 lfts.; lfts. oblong, 2–3.5 cm. long, very short-stalked, the midrib nearer but not close to the upper margin. (*A. lebbek* Hemsl., not Benth.) C. and E. China to India. Intr. 1907. Zone VIII?

Page 501, under No. 5 add after **Indigofera macrostachya:**

—Another related species is **I. pseudotinctôria** Matsum. Shrub to 2 m.: lfts. 5–11, elliptic-obovate or elliptic to elliptic-oblong, 6-25 mm. long, obtuse and mucronate, glaucescent beneath; petiole 1–3 cm. long: fls. pink or light red, in dense racemes 4–12 cm. long; standard oblong-obovate, 5–6 mm. long; pod 2–3.5 cm. long, slightly appressed-pubescent. Fl.VII–X. Japan, E. and C. China. Intr. 1908. Zone V.

Page 524, after **Phellodendron amurense** insert:

A closely related species or possibly only a form of *P. amurense* is **P. pyrifórme** E. Wolf. Lfts. more abruptly acuminate, cuneate: stigma scarcely broader than style; gynophore longer: fr. pyriform. M.D.1925:216(l). Orig. unknown. Cult. 1891.

Page 573, after **Acer Davidi** insert:

A related species is **A. Hersii** Rehd. Lvs. ovate or broad-ovate, 3-lobed, lobes acuminate, cordate, slightly rufous-pubescent beneath toward the base at first, soon glabrous; wing with the nutlet 1.5–2.2 cm. long. N. China. Intr. 1923.

Page 577, after 51. **Acer nikoense** insert:

A related species is **A. triflôrum** Komar. Tree to 8 m.; brts. soon glabrous: lfts. oblong-ovate to oblong-lanceolate, 4–8 cm. long, entire or with 1–3 coarse teeth, glaucous beneath and glabrous except pilose along midrib; petiole 3–6 cm. long, sparingly pilose; infl. 3-fld., pubescent: wings nearly straight, spreading at an obtuse angle, with the densely pubescent thick nutlet 3.5–4 cm. long. N.K.1:t.11. Manch., Korea. Intr. 1923.

Page 660, after **Echinopanax elatus** insert:

—Another closely related species is **E. japónicus** Nakai. Lvs. sometimes peltate, more deeply incised, conspicuously ciliate, with long-acuminate lobes and lobules: pedicels slenderer, in fr. up to 1 cm. long. Japan. Intr. 1915. Zone V.

Page 663, under **Acanthopanax ricinifolius** add as a note:

According to Koidzumi *Acer septemlobum* Thunb. is identical with *Acanthopanax ricinifolius:* the name of the latter therefore becomes **A. septêmlobus** Koidz.

Page 732, after **Ceratostigma plumbaginoides** insert:

A related genus is **Acantholîmon** Boiss. Low tufted subshrubs or herbs with linear rigid lvs.: calyx funnelform; corolla white or rose; stamens inserted at base. More than 80 species from the e. Mediterr. region to C. Asia.—The species most often cult. is **A. venûstum** Boiss. Subshrub to 25 cm.: lvs. crowded, subulate, about 3 cm. long, nearly pungent, concave above, rounded on back: peduncles 7–10 cm. long; spikes 5–8 cm. long, curved; fls. about 1.5 cm. across, rose; calyx yellow-brown. Fl.VII–VIII. Asia Minor. Cult. 1866. Zone VII?

Page 749, after **Fraxinus holotricha** insert:

A related species is **F. Pallisae** Wilmott. Lfts. 5–9, rarely 11, sessile, ovate-lanceolate, rounded to broad-cuneate at base, remotely crenate-serrate: anthers on short filaments: fr. oblong, obtuse, 4–5 cm. long. M.D.1925:281,f.2,3,5. Balkan Pen. Intr. about 1840? Zone V?

Page 825, under **Lonicera coerulea** after var. **graciliflora** insert:

Var. **viridifôlia** Dipp. Similar, but lvs. ovate to obovate, 1.5–3 cm. long, bright green: corolla with rather short tube. (*L. Kirilowii* Hort.)—Var. **angustifôlia** Reg. Brts. finely velutinous: lvs. oblong to oblong-lanceolate, 2–4 cm. long, finely pubescent when young: corolla small, slightly pubescent; cupula sometimes divided at apex and not closely appressed. S.H.2:f.442c(l). Turkest.—

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